The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Ammonium Nitrate Explosions

IT is clear, from the inquiry both into the Oppau explosion and into the more recent explosion at Nixon, New Jersey, that our knowledge of the explosibility of ammonium nitrate is still far from complete. The German conclusion, which is practically the same as the conclusion of British experts, is that the disaster at Oppau was caused by blasting and that this method of breaking up solid materials containing nitrates should be finally abandoned. There is, the German committee add, no other source of danger in the manufacture and transportation of fertiliser salt, even though an unusual concentration of nitrate should occur. The fertiliser salt referred to is either a mixture or a double salt of NH_4NO_3 and $(NH_4)_2SO_4$. The mixture is regarded by German authorities as explosive, but the double salt as not. The explosive used by them was perastralite, which has been known to detonate a small quantity of normal fertiliser salt, but not a large quantity because the salt is not sensitive enough to propagate the explosion. Under certain conditions pure ammonium nitrate has been completely detonated by perastralite, but many experiments have failed to produce a complete detonation of the double salt, and more than 30,000 shots had been fired at Oppau before the disaster.

After Oppau came the explosion at Nixon, investigations into which show that ammonium nitrate and its mixtures can be detonated with certainty under some conditions. Dr. Aufschläger in some experiments used a nickel-steel bomb of 40 c.c. capacity and found that the ammonium nitrate (5 grams) could be detonated completely only with a particular copper cap—in other words that, although not impossible, it was extremely difficult to detonate it at all. Mr. C. E. Munroe, the chairman of the American investigation committee, thinks it important to impress on all who deal with ammonium nitrate that, although under ordinary conditions it is innocuous and highly insensitive to shock, under other conditions it may give rise to disaster. Among these conditions temperature and close confinement deserve to be remembered. His opinion is that the evidence obtained goes to show that ammonium nitrate offers much the same fire hazard as sodium nitrate, and that when packed by itself in wooden receptacles and apart from explosive substances it is, for the purposes of transportation and storage, not an explosive. Mr. G. N. Norman, of the Hercules Powder Company, considers that ammonium nitrate is not an explosive by itself, because millions of pounds of it have been and are now being manufactured every month in Europe and in the United States. To the best of his knowledge no serious explosion has ever resulted during the course of such manufacture except where other compounds have been present such as TNT or other nitrated organic bodies. Ammonium nitrate in his opinion does not constitute anything more than a fire hazard when handled by itself. In combination with other materials, however, a sensitive high explosive may be formed, but he points out that the same is true of sugar, flour, gasoline and illuminating gas, as well as hundreds of industrial dusts such as aluminum powder. Mr. R. I. Bashford, of the Pierless Explosives Company, states that private experiments indicate that nitrate of ammonia of the degree of fineness commonly used by manufacturers of such explosives is very difficult to detonate, but that it can be detonated by fulminate caps, and further that the sensitiveness to detonation is considerably increased by relatively small amounts of carbonaceous material. He knows of no explosion of nitrate of ammonia in the United States in which the evidence did not tend to prove the presence of other organic nitrates or carbonaceous matter.

The general conclusion to be drawn from all this is that ammonium nitrate, under ordinary conditions

and ordinary treatment, is not to be regarded as an explosive, but that there remains a fine margin of hazard and that there is still room for considerable research in the matter. The one point, reached by the empirical rather than the scientific method, on which all are now agreed is that blasting operations such as those employed at Oppau must be discontinued.

Annual Reports on Applied Chemistry

WE have just received for notice a copy of the volume issued by the Society of Chemical Industry containing the now well-known annual reports of the progress made in the outstanding features of all the more representative branches of applied chemistry during the year 1923. It has been our pleasure in the past to compliment not only the editor of the volume but the writers who contribute towards making it one of the most valuable pieces of accessory literature which the industrial chemist finds at his disposal. Textbooks we must have, but this volume plays rather a different rôle in that it serves to make our standard works more valuable by taking us beyond the point where they, by reason of their date of publication, have to stop. The progress of science is so rapid nowadays that it is essential to be equipped with something of this sort, and we believe it was Sir George Beilby who once suggested that, if practicable, it would be a great step forward if periodical supplements could be issued in connection with the recognised and usually expensive standard reference books. The Society's volume of annual reports is certainly a development along these lines, and it is almost to be wondered that the learned societies and institutions connected with other branches of technology do not follow the practice more.

For some years now when commenting on the reports we have urged that as the value of the information to the majority of readers lies in its absolute freshness, publication should be arranged at an earlier period in the year. This year at least we have a distinct advance, for the volume has usually not been available until towards the end of June. As in the previous year, no fewer than twenty-four distinct branches of applied chemistry have been dealt with, many of them by authorities who seem to have firmly established themselves as the only writers capable of dealing with certain specific subjects. These perennial reappearances are apt, perhaps, to deprive us of the advantages of originality, but on the other hand they bring with them all the advantages of experience. Amongst the newcomers one notices the names of Mr. J. H. West, Mr. E. C. Evans, and Dr. G. N. White, while the important subject of "Gas—Destructive Distillation—Tar Products" is in the hands of two writers, Mr. F. M. Potter and Mr. D. Ivor James, who will be recognised as occasional contributors to our columns. Though not exactly associated with the practical side of coal distillation they have given a remarkably well-balanced review of a particularly wide and difficult subject. For the benefit of those who are not members of the Society it should be added that the volume may be obtained by non-members at 12s. 6d.

Prosperity of the Nitrate Industry

THE recent reports issued by the Chilean nitrate producing companies have certainly confounded those prophets who at the close of the war predicted that the older forms of nitrogenous fertilisers would be unable to stand up commercially against the synthetic products. Nearly all the nitrate undertakings have been able to present most satisfactory balance sheets for the past year, and as an indication of the state of the present demand, compared with that of a decade ago, it may be recalled that in 1913–14, the record pre-war year, the total nitrate consumption amounted to 2,630,000 tons, while in 1923 it was 2,150,000 tons. In contrasting these figures it has to be borne in mind that Germany, who used to absorb some 850,000 tons per annum, has disappeared as a consumer, but a great deal of the lee-way has been made up by increased consumption in the United States to the extent of about 350,000 tons, and it is estimated that in the current year a further substantial increase in world consumption may be looked for. The difficulties in trading which arise in connection with the near European countries are largely the result of inconsistent exchanges, and it is said that continental agriculturists —particularly those in Germany—much prefer the natural nitrate to synthetic products. Although, however, the German output was considerably reduced during the year ending April 30 last as compared with the previous year, thus occasioning a demand which was greater than the supply, dealers in Chilean nitrate were able to do little business with the German buyers owing to the difficulty of converting the rentenmark into sterling.

An important pronouncement has just been made in connection with the Chilean Nitrate Producers' Association which was formed in 1919 to protect the interests of the oficinas and to conduct propaganda work of an educational nature in much the same way as the interests of the sulphate of ammonia producer are watched over by the B.S.A.F. The Nitrate Association was due to terminate on June 30 next, but it has been decided to renew it for a further period of six years, with the definite understanding that members may, if they wish, revert to the free selling of nitrate at the end of the first three years. The Association has just fixed prices, which are on a gradually ascending scale, for the forthcoming year, and which are considered likely to show producers an average advance of 7d. per quintal over the prices obtained during the present year.

Chemical Engineering Group

THE annual meeting of the Chemical Engineering Group, reported last week, shows that no difficulties of any sort have arisen through the establishment of an Institution of Chemical Engineers. On the contrary, the Group's membership has risen from 315 to 386, the statement of accounts shows a balance in hand of over £140, and the past year is described as "a most successful one, scientifically and financially." It looks, therefore, as if the establishment of the Institution, instead of restricting the Group's activities, is more likely to enlarge them, and that the excellent

work the Group has done in organising discussions, bringing all parties interested in chemical engineering problems together, and encouraging helpful interchange of ideas and experience, will be even more necessary in the future than in the past. The Group and the Institution are, in fact, complementary organisations, and it is satisfactory to find that they are working in such a complete spirit of co-operation and mutual understanding. The retirement of Mr. J. A. Reavell from the chairmanship of the Group breaks a long and most fruitful association, but Mr. C. S. Garland, his successor, has been so successful with the various organisations he has taken up that he is hardly likely to fall short here.

A Decline in Overseas Trade

IMPORTS and exports of chemical products during April were diminished in value compared both with the previous month and with April of last year. This diminution of trade is probably no more than a normal fluctuation, and is parallel with a falling off which has occurred in the whole trade of the country at the same time. The actual amount of diminution in the import of chemical products is £27,000 on April, 1923, and £573,000 on March of this year, the totals for the respective periods being £1,100,000 and £1,600,000. Exports also have dropped considerably compared with March, from £2,352,000 to £1,865,000, a fall of some £487,000, but compared with the corresponding period in 1923 the April figure shows a decline of only £184,000. There is little call for comment on the individual figures for different products, the changes being all of a normal order. It is, however, interesting to note that exports of sulphate of ammonia have declined slightly for the first time for many months. Other important chemicals have shown good increases, however, and it is particularly interesting to note the maintained increase in the exports of synthetic coal tar dyes, which is a good indication of the state of the British dye industry. Though on the basis of the official returns April has been less satisfactory than some months previously, it is reassuring to note that there is a fairly confident feeling in business circles, and there seem to be far fewer complaints of bad trade than there were a year ago.

No Club Politics

WE are inclined to think that the member of the Chemical Industry Club who writes to protest against the Club being represented on deputations to the Board of Trade respecting controversial matters of business is right, and that the majority of the members would agree with him. The Club, as a club, has no politics; how British or German firms manage their business is not its concern; trade policies and trade agreements are entirely outside its purview. It is simply a social centre and common meeting ground for all interested in chemical industry—whether manufacturers or merchants, professors or students, research men or practical technologists, consulting chemists, works chemists, or chemical engineers. Its success is due to that broad basis, and while it continues to be the comfortable, contented, and well-managed institution it at present is there is no need to cultivate outside alliances which may end in entanglements. We think it important in the interests of the Club that its original platform of independence should be jealously safeguarded, and its association with the recent deputation to the Board of Trade was, in our opinion, a mistake from every point of view. The Club's sound policy is to keep out of foreign politics.

Points from Our News Pages

A description is given of a novel and convenient apparatus for electro metric analysis (p. 508).

The returns of overseas trade for April show decreases both in the imports and exports of chemicals (p. 509).

The British Empire Exhibition at Wembley may now be considered virtually complete so far as the Chemical Section is concerned (p. 511).

The President of the Board of Trade in reply to a question in the House gave the outline of the German Reparation Dye Agreement (p. 517).

A review of the book *Chemistry in the Twentieth Century* is given, signed by Professor Arthur Smithells (p. 512).

According to our London Market Report a better inquiry has been experienced during the week (p. 524).

The improvement in business noted last week in the Scottish chemical market has not been very well maintained (p. 525).

Books Received

SPECTROSCOPY. Vol. I. By E. C. C. Baly. London: Longmans Green and Co. Pp. 298. 14s.

THE THERMAL PROPERTIES OF METHYL CHLORIDE. By D. N. Shorthose. Food Investigation Board of the Department of Scientific and Industrial Research. Special Report No. 19. London: H.M. Stationery Office. Pp. 18. 1s.

MANUFACTURE OF ACIDS AND ALKALIS. By Lunge and Cumming., Vol. II: Manufacture of Sulphuric Acid (Chamber Process). By Wilfrid Wyld. London and Edinburgh: Gurney and Jackson. Pp. 424. 31s. 6d. Vol. III: Concentration of Sulphuric Acid. By J. W. Parkes. Pp. 394. 31s. 6d.

THE ELECTRON IN CHEMISTRY. By Sir J. J. Thomson. London: Chapman and Hall, Ltd. Pp. 144. 10s. 6d.

THE INSTITUTE OF CHEMISTRY OF GREAT BRITAIN AND IRELAND—REGISTER OF FELLOWS, ASSOCIATES AND STUDENTS (Corrected to November 1, 1923.) Pp. 322.

The Calendar

May 12 to 23	British Industries Fair	Castle Bromwich, Birmingham
21	Royal Society of Arts (Trueman Wood Lecture): "The Outlook in Chemistry." Sir William J. Pope. 8 p.m.	John Street, Adelphi, London, W.C.2.
21	Society of Glass Technology.	London.
22	Society of Dyers and Colourists: Annual Meeting. 7.30 p.m.	Midland Hotel, Bradford.
27	Society of Glass Technology: Meeting.	Conference Hall, British Empire Exhibition, Wembley.
27	Society of Glass Technology: Annual Dinner.	Hotel Cecil, Strand, London.
30 and 31	British Science Guild Conference: Science and Labour	Conference Hall, British Empire Exhibition, Wembley.
June 2	Society of Chemical Industry: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London, W.1.
3–6	Institute of Mining and Metallurgy: Empire Mining and Metallurgical Congress.	Conference Hall, British Empire Exhibition, Wembley.
4	Institute of Metals (Annual May Lecture): "Atoms and Isotopes." Dr. F. W. Aston.	Institution of Mechanical Engineers, London.
5	Chemical Society: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London, W.1.

Apparatus for Electrometric Chemical Analysis

Chemical engineers should be interested in the apparatus described by the author, which has recently been designed for electrometric chemical analysis—primarily as an instrument of precision with which operations can be carried out with the high degree of accuracy required by modern scientific research, and, secondly, as an apparatus for routine industrial work where great accuracy is not essential.

THE electrometric method of analysis has various applications, such as the determination of pH value of hydrogen ion concentration in blood, or in various media including coloured solutions such as wines, dye baths, tanning liquors, in opaque solutions and those containing emulsions or colloidal matter such as bacteriological media, sera or fermentative vat fluids; also for the standardisation of indicators and the investigation of the action of neutral and buffer salts and the electrometric

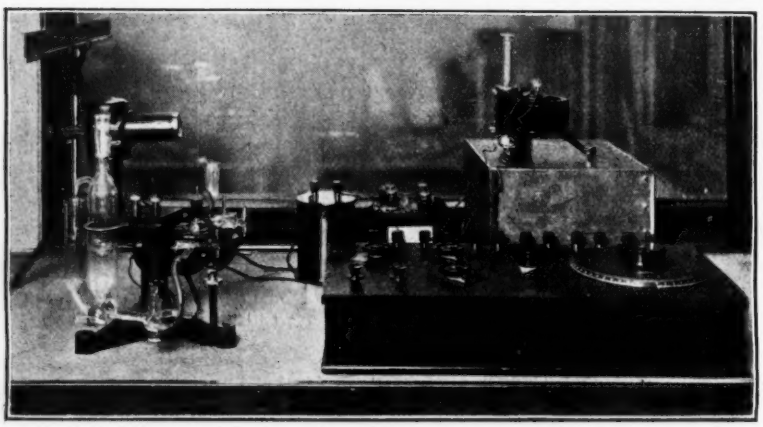


FIG. 1. APPARATUS FOR ELECTROMETRIC CHEMICAL ANALYSIS
(The Cambridge Instrument Co., Ltd.)

titration of acids and bases in these solutions. These operations can readily be accomplished with precision by the hydrogen electrode, as this method possesses many advantages over the usual "indicator" method, which is frequently inapplicable, and errors due to the personal equation in the determination of end points, masked or otherwise, or to unsuitable lighting or salt effects, are eliminated. Electrometric titrations can be made of oxidising or reducing agents such as permangantes, dichromates, peroxides, ferrous salts or mercurous nitrate; the method possesses great advantages when routine analyses of metals such as chromium, vanadium, or manganese in steels or alloys are under consideration. With slight modification the apparatus can be used for the electro-analysis of metals in alloys by the method of graded potential; the results are obtained much more quickly than by the older method of simple electro-deposition and are equally as accurate.

Now if a rod of metal be dipped into water the metal will acquire a negative charge relative to the water, and a small quantity of metal will be found in the water in the form of metallic ions. The actual quantity of metal passing into solution can scarcely be detected by ordinary chemical tests because as each positive ion leaves the metal the potential difference between the metal and the water rises, making it more difficult for subsequent ions to pass into solution against the electrostatic forces set up. Equilibrium is therefore the result—the potential difference between electrode and solution depends upon the solution tendency or electrolytic solution pressure of the metal, a value characteristic for each element. If the solution already contains ions of the metal in question there will be a tendency for these ions to be deposited on the electrode, which will thus acquire a positive charge with reference to the solution. The actual potential difference between the metal and the solution depends on these two factors. Since for the same metal the solution tendency is a constant, the potential difference between a metal and a solution of its ions gives us a method of determining the concentration of the ions in the solution.

Need for the Hydrogen Electrode

For determining the concentration of hydrogen ions in solution it is necessary to employ a hydrogen electrode. Hydrogen itself being a gas and a non-conductor of electricity, cannot function as an electrode, but it has been found that metals such as platinum, palladium and iridium, when saturated with hydrogen gas, do not function as metal electrodes, but as hydrogen gas electrodes. The hydrogen dissolved and occulded in the metal is in equilibrium with the hydrogen ions in the solution, the metal acquiring the requisite electric charge for equilibrium to be established.

As it is often difficult to measure the potential difference between an electrode and the solution in which it is immersed, it is customary to introduce into the solution another half element or electrode and to complete the cell by means of a liquid junction; this liquid junction in practice generally consists of a saturated solution of potassium chloride. The concentration of the hydrogen ions in the arbitrary solution containing the hydrogen electrode can readily be determined from a measurement of the total E.M.F. of the cell, less the E.M.F. of the half element, provided that the potential difference of the latter in its solution be constant. A hydrogen electrode in a solution normal in respect to hydrogen ions is employed as a theoretical standard and is assigned the arbitrary value of E=0 volts. The calomel electrode is generally employed as the constant half element. As the concentration of the hydrogen ions in the solution lowers, that is as the solution becomes more alkaline, the observed E.M.F. of the cell continues to rise, for example, the E.M.F. of a cell in normal hydrogen ion solution with a decinormal calomel half element is 0·3380 volts (at 18° C.), while in an absolutely neutral solution it rises to 0·7480 volts. The opposite effect will be shown when the solutions are acid.

Experimental and Industrial Forms

The apparatus illustrated has been designed in two forms

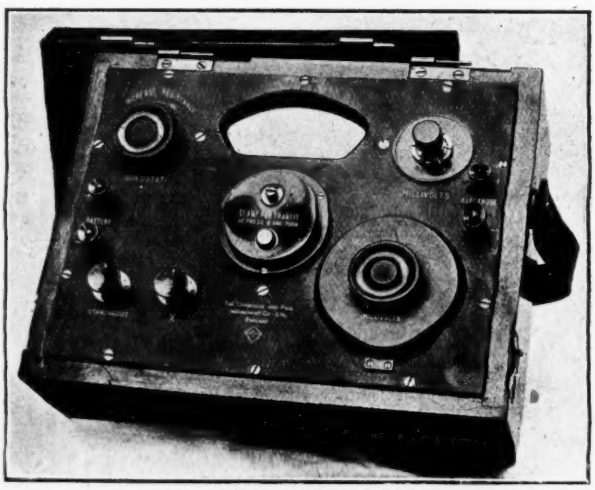


FIG. 2. THE INDUSTRIAL OUTFIT

one for laboratory use, Fig. 1, and the other for industrial purposes, Fig. 2.

The apparatus shown in Fig. 1 consists of a potentiometer, galvanometer, Weston normal cell, 2-volt accumulator and a lamp and scale outfit together with suitable electrodes.

The potentiometer is a modified form of the ordinary slide wire instrument, a special feature being the mounting of the wire inside the case. All the moving parts, with the exception

of the handles of the controlling switches, are inside the case, thus eliminating corrosion and other deteriorating effects. A selective switch is fitted and terminals are provided to connect to three separate electrodes. The remaining terminals connect to the galvonometer, Weston normal cell and accumulator, respectively. The resistances are of manganin, hard soldered to copper, thus minimising thermo-electric effects. The galvanometer is of the D'Arsonval pattern, which is particularly robust and reliable. The Weston normal cell is used to standardise the potentiometer. The lamp and scale outfit includes a 4-volt 3-ampere gas-filled lamp, which gives a clearly defined mark on the scale when used in a well-lighted room.

With this oufit readings are obtained directly to 0·1 millivolt and by estimation to within 0·01 millivolt.

The special feature is the hydrogen electrode vessel, illustrated in Diagram 1. Two of these vessels are mounted side by

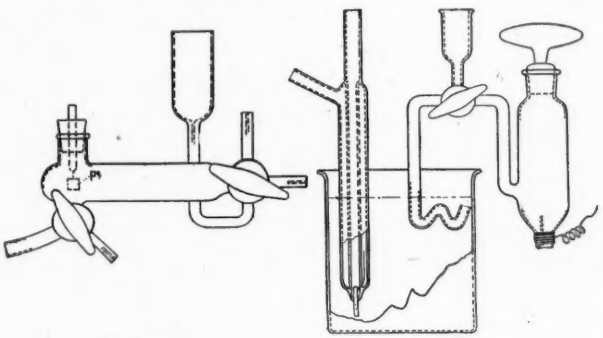


DIAGRAM I. (Hydrogen Electrode Vessel)

DIAGRAM II. (Electrodes designed by Dr. E. K. Rideal)

side so that a cam, driven by a small electric motor, gives them a continuous rocking motion. For some biochemical studies, for example, when dealing with actively fermenting culture, it is sometimes absolutely essential that equilibrium be rapidly attained. In the past it has been found that a constant potential can be rapidly attained by shaking the hydrogen electrode vessel and also that by periodically immersing and exposing the platinum electode, only a thin film of liquid has to be penetrated by the hydrogen before absorption by the platinum black. These two principles have been embodied in the design of the vessel shown. The rocking motion is so adjusted that during each revolution of the cam the platinum is alternately immersed and exposed by the solution under test.

The Industrial Outfit

The apparatus shown in Fig. 2 consists of a self-contained portable potentiometer together with suitable electrodes. It consists of a pointer galvanometer of the unipivot type, an adjustable resistance to standardise the battery circuit with the galvanometer, a five-range switch to give steps of 200 millivolts and a fine adjustable resistance. The electrodes are connected to the right-hand terminals of the instrument, a dry cell being connected to the left-hand terminals. With the standardising key depressed, the rheostat is adjusted until the pointer of the galvanometer is directly over the red mark on the scale. The "X" key is then lightly depressed and the range switch set to give the minimum deflection while the circular graduated dial is at zero. To obtain the final reading the latter is rotated until the pointer comes to zero. The reading of the circular dial is then added directly to the number of millivolts indicated by the range switch, this total giving the E.M.F. of the electrodes. Readings are obtained directly to 1 millivolt.

The electrodes, which have been designed by Dr. E. K. Rideal, of Cambridge, are shown in Diagram 2. The hydrogen electrode is provided with a small hollow platinum cylinder which is perforated by a number of tiny holes through which the hydrogen is blown into the solution, forming a number of small bubbles. In the calomel electrode the capillary tube is extended to accommodate a small reservoir which holds a supply of potassium chloride solution as a connecting fluid. This arrangement dispenses entirely with the need of a connecting vessel.

Chemical Trade Returns for April

Decrease in Imports and Exports

CHEMICALS, dyes, drugs and colours imported last month totalled £1,157,752 in value, against £1,629,954 in the previous month, and £1,184,826 in April, 1923, a decrease in each case. Exports dropped to £1,865,154 compared with £2,352,315 in March and £2,049,355 in April last year.

Examination of the detailed figures of quantities imported and exported, as set out below, reveals marked decreases in the imports of borax, calcium carbide, potassium compounds and certain dyestuffs; also in the exports of naphthalene, sodium sulphate and white lead. Sulphate of ammonia also shows a decrease for the first time for many months. Notable increases are in the imports of bleaching materials, sodium compounds and alizarine dyestuffs, and in the exports of sulphuric acid, potassium and sodium compounds generally, and coal tar dyestuffs.

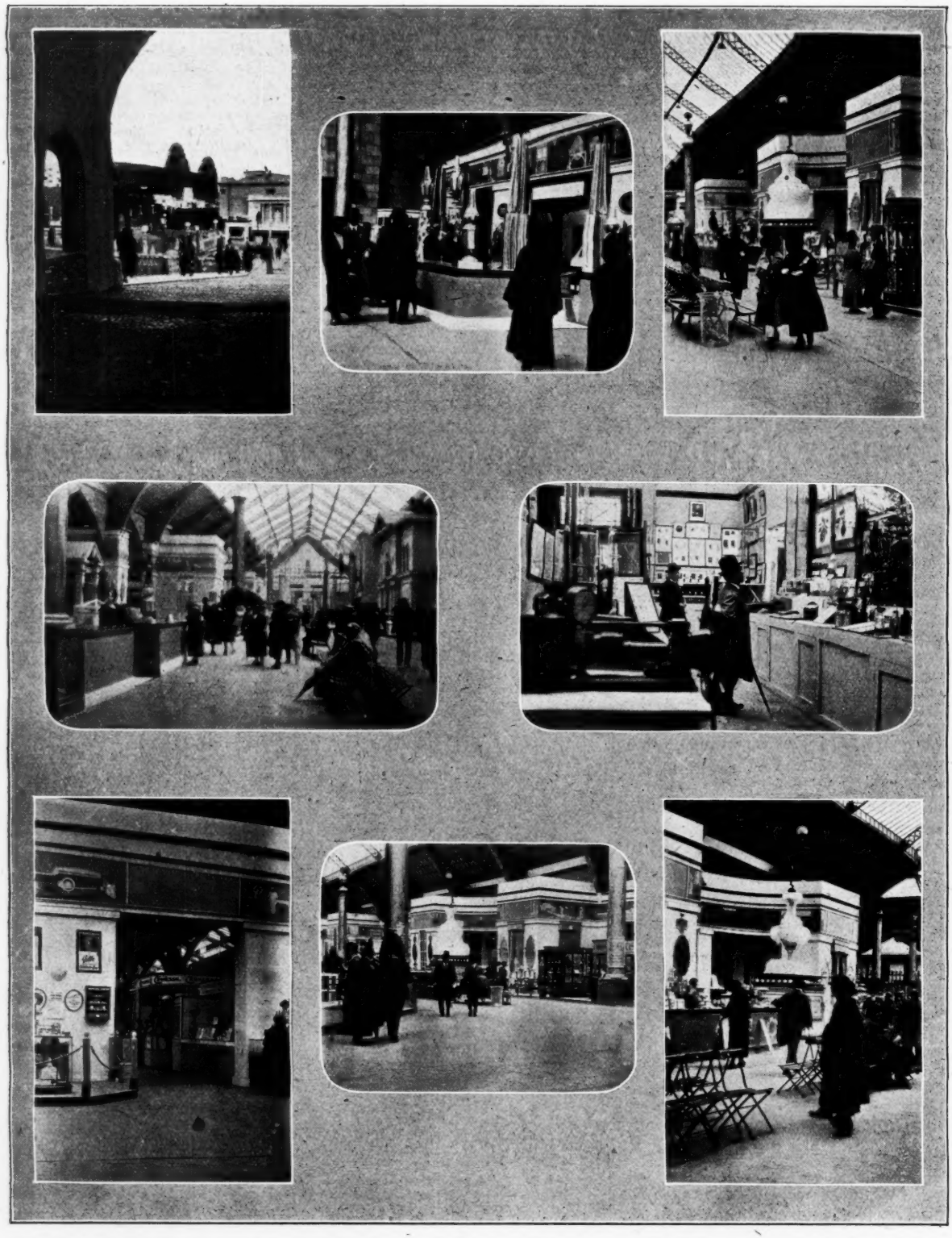
Imports for April

		1924	1923
INCREASES.			
Bleaching materials	cwt.	5,803	1,862
Sodium nitrate	,,	66,635	65,037
Sodium compounds except nitrate	,,	19,057	13,971
Cream of tartar	,,	3,497	2,337
Zinc oxide	tons	674	540
Intermediate coal tar products, including aniline oil and salt, and phenyl glycine	cwt.	60	1
Alizarine dyestuffs	,,	197	95
White lead	,,	8,618	6,264
Unspecified painters' colours, etc.	,,	67,912	55,695
Essential oils, except turpentine	lb.	348,463	273,877
Mercury	,,	471,697	113,978
DECREASES.			
Acid, acetic	tons	566	678
Acid, tartaric (including tartrates)	cwt.	2,480	3,244
Borax	,,	4,900	6,989
Calcium carbide	,,	23,982	69,023
Glycerin, crude	,,	1,303	1,334
Glycerin, distilled	,,	130	433
Red lead and orange lead	,,	2,616	4,109
Nickel oxide	,,	41	8,884
Potassium nitrate	,,	5,496	8,516
Potassium compounds except nitrate	,,	439,038	508,471
Unspecified coal tar dyestuffs	,,	1,693	3,206
Natural indigo	,,	55	79
Barytes, including blanc fixe	,,	62,191	78,428
Turpentine	,,	7,097	22,070

Exports for April

		1924	1923
INCREASES.			
Acid, sulphuric	cwt.	1,686	1,403
Ammonium chloride	tons	309	275
Bleaching powder	cwt.	17,880	17,451
Anthracene	,,	251	3
Benzol and toluol	galls	10,545	10,169
Naphtha	,,	50,206	3,605
Unspecified coal tar products	cwt.	22,537	22,305
Distilled glycerin	,,	16,635	7,808
Potassium chromate and bichromate	,,	2,144	2,002
Potassium nitrate	,,	1,024	2,133
Other potassium compounds	,,	4,674	1,706
Caustic soda	,,	165,933	155,258
Sodium chromate and bichromate	,,	3,239	2,730
Sodium compounds otherwise unspecified	,,	52,938	46,880
Coal tar dyestuffs	,,	9,982	7,209
Dyestuffs other than coal tar	,,	6,277	5,874
Paints and colours ground in oil or water	,,	27,462	26,336
Paints and enamels prepared	,,	46,239	43,353
DECREASES.			
Acid tartaric, including tartrates	cwt.	899	1,133
Ammonium sulphate	,,	12,148	13,681
Carbolic acid	,,	9,618	9,980
Naphthalene	,,	3,757	17,652
Tar oil, creosote, etc.	gals.	1,999,073	2,426,831
Copper sulphate	tons	5,304	7,577
Crude glycerin	cwt.	2,946	5,319
Sodium carbonate, etc.	,,	537,121	588,823
Sodium sulphate including saltcake	,,	27,779	69,911
Zinc oxide	tons	511	456
Barytes, including blanc fixe	cwt.	5,941	6,832
White lead	,,	10,455	15,790

"C. A." Photographs at the British Empire Exhibition



With the exception of the first, which is a view showing the Stadium, the above photographs all show various portions of the Chemical Section in the Palace of Industry as it now appears. The decorative frieze and other features can easily be distinguished, while one view gives a glimpse of the Scientific Sub-Section.

The British Empire Exhibition at Wembley

News and Notes of Chemical Interest

THERE is no doubt that the Wembley exhibition depends for its full effectiveness upon good weather. Apart from the fact that this has not been much in evidence of late, there is now no reason why the prospective visitor who has been held back by the fear of finding a desolate wilderness of unfinished buildings need delay any longer. In places there are to be found still scaffolding, planks, barrows and all the paraphernalia of the builders' trade, but these things want looking for in odd corners and do not obtrude upon the eye. On a wet day, too, there is mud, not special mud like that found in Flanders, but just the ordinary mud to be found in the average English town street in wet weather. All the main buildings are complete, the flags are flying, the lighting arrangements are perfected, and finally the trees are in full and fresh leaf, so it is doubtful if the exhibition will ever look better during the whole season than it does now. It may be mentioned that the trees which add so much to the general effect are those which have existed in Wembley Park for many years, and they include some very fine flowering varieties, now in full blossom.

The anticipated effectiveness of the scheme of decoration of the Chemical Section is fully justified, and it is undoubtedly the brightest and yet one of the most harmonious in the whole exhibition. This is largely due to the extensive use of white paint (we are not told if it is based on white lead or of the leadless variety) set off by the decorative and symbolic frieze and occasional touches of colour.

The United Alkali Exhibit

Quite distinct from the general scheme, however, is the stand of the United Alkali Co. which is constructed in mahogany relieved with gilded filigree work. We understand that one reason for this difference in style is that it is intended that the stand should be used in other places later on, so that many who are unable to visit Wembley will have the advantage of seeing the actual exhibit. The stand, which is of the open type surrounded by a handsome balustrade, consists of a central erection which serves as an inquiry office and two rotating hexagonal columns, which illustrate the firm's products and their uses. A study of these panels is in itself a complete object lesson in the fundamental importance of the heavy chemical industry and its growth during the century of the firm's existence. Thus there are in one panel samples of soap and the chemicals used to produce this commodity, another demonstrates the connection between fine glassware and saltcake, a third the uses of sulphide of soda in the leather trade, another the use of soda ash for enamels, and so on. A most effective panel illustrative of the growth of the chlorine industry shows below a tube of liquified chlorine of the form used when Faraday discovered that this was possible in 1823, while a model train of tank wagons above shows that this is the method of handling the product in 1923. The contrast between black and white fabrics in another panel illustrates the dependence of both the dyer and the bleacher on the alkali manufacturer.

The scheme of panels is also carried out on the central kiosk. Here there are large photographs illustrating paper making, calico dressing, dyeing, glass manufacture, etc., with samples of the various chemicals used below them. One face of this kiosk is occupied with samples of 64 products of benzol and toluol arranged to show how they are derived from the parent products, which is ample demonstration of the ability of the firm to manufacture organic, and in some cases "fine," chemicals as well as the more usual heavies associated with the founders of the British chemical industry.

Centrifugal Machines

The Chemical Section alone, with its hundred exhibitors, does not cover the whole field of exhibits of interest to industrial chemists. Indeed many of the chemical exhibits will interest the general public rather than the chemist, which is all as it should be. As an example of this the soap-making exhibit by D. and W. Gibbs, Ltd., may be mentioned, where many of the processes may be inspected. In the engineering section in particular there is much to interest the chemist, however. To the examples already mentioned the exhibit of Pott, Cassels and Williamson may be added. This is Stand 56, in Avenue 6, Bay 21 (the system of numbering and "co-ordinating" the various stands in the Palace of Engineering is very easy to follow on the spot). Here there are to be seen various centrifuges, which are fitted with direct-coupled electric motors in the majority of cases. These include a nine-inch laboratory model for sugar, and a 36 in. model used for drying sulphate of ammonia. This latter is fitted with a lead-lined case and a copper basket, though the makers are now recommending Monel metal for chemical work as they consider the extra cost more than justifies itself in durability.

An example of a Monel metal basket for a 36-inch centrifuge may be seen on the stand of G. and J. Weir, Ltd. (Stand 47, Avenue 6, Bay 16-17). The firm state that some users have found that these baskets have a life of five months against six weeks, the average for a copper basket, when used for sulphate of ammonia. Another user working with sulphate containing up to 1 per cent. H_2SO_4 and ·5 per cent. NH_3 found a life of nine months for a Monel metal basket of 24-gauge against three months for a copper one of 18-gauge, and the extra cost of the Monel metal was only 1s. 9d. There are also to be seen at this stand a number of examples showing the resistance of Monel metal to corrosion by sea water, etc., which are well worth investigation.

Points from the Building Section

The Building Section in the Palace of Industry also has an important chemical engineering exhibit by the Thermal Syndicate, Ltd. This may be found by passing through the exhibits dealing with Portland cement and Welsh slates, and consists of a display of Vitreosil ware, which, as is well known, is made of fused quartz. The panels of the stand itself are made of opaque Vitreosil and a popular display is made of Vitreosil gas globes, which may be sprayed with water when red hot, and yet do not break. The chemical interest, however, is in the laboratory and industrial apparatus, the former in the transparent fused silica and the latter in the opaque form. Both possess similar heat-resisting properties and complete resistance to acids of all strengths and temperatures which no other material can equal. The display of vessels, distilling plant and acid concentration plant for industrial manufacture will be a revelation to some as to what is now possible in this material at a reasonable cost.

In the Building Section may also be found the exhibit of Ozonair, Ltd., where apparatus for the production of ozone is on view. It may be remembered that this is used in connection with ventilation systems for industrial purposes, so that a supply of oxygen in active form may be kept up. This system has been installed in one of the London tube railways for many years, and it is interesting to note that a recent investigation found that the air on this particular line had the lowest concentration of bacteria of all the lines in London.

A Visit to the Gas Exhibit

On Wednesday a large company associated with the gas industry made an official visit to the Gas Exhibit in the Palace of Industry. Following on a meeting of the Exhibit Committee in the morning, Mr. D. Milne Watson presided at a luncheon in the Stadium restaurant. Sir Arthur Duckham, proposing the toast of "Success to the Gas Exhibit," said that the exhibit marked a new era that was gradually being prepared for them—an era that must come, the era of the smokeless city. Mr. D. Milne Watson, in his reply, said that the Gas Exhibit was a co-operative effort by brothers working in harmony for the good of the family—a family that included some 150,000 workers, employed £150,000,000 of capital, and was at the service of over 8,000,000 homes and places of business. It was intended to show the various uses of gas to the community.

Institute of Metals Booklet

Intended primarily for the use of visitors to the British Empire Exhibition, the Institute of Metals has prepared a special booklet which, when bearing a visitor's signature, serves as a card of introduction to the meetings of the Institute and to the library of the Institute during the period of the Exhibition. This facility is intended to appeal primarily to Overseas visitors, who can obtain copies of the booklet either through their respective High Commissioners' Offices in London, from the Secretary of the Institute of Metals, Mr. G. Shaw Scott, M.Sc., 36, Victoria Street, S.W.1, or at the Exhibition, on Stand No. 237, Palace of Engineering.

Chemistry in the XXth Century

A Review by Professor Smithells

CHEMISTRY IN THE TWENTIETH CENTURY. Prepared under the Guidance of a Committee representing the Scientific Societies, with Dr. E. F. Armstrong as Chairman and Editor. London: Ernest Benn, Ltd. Pp. 282. 15s.

All concerned in the production of this work are to be congratulated without stint on the attainment of a complete and most striking success. There has been nothing quite like it before, and it is improbable that there will be anything quite like it again for a long time to come. For it is the product of very special circumstances. In the first place, it follows upon a time of activity in chemical science for which the term revolutionary is hardly too strong, and in the second it is an offspring of the great Exhibition of 1924 and is actuated and activated by a very laudable kind of patriotic zeal to let people see where Britons have stood and stand to-day in these great campaigns of the chemical forces. It should, however, be understood that the work does not offend or take the character of a national pæan to be broadcasted to the world from Wembley; the English chemist on his island is not apt to be insular in the recognition and appreciation of the work of other nations. The desire to do justice to chemistry is far more evident than any effort to glorify immoderately our own part in its advance.

It is known that the book had to be produced under severe conditions of time limitation, and many distracted editors will surely doff their caps to Dr. E. F. Armstrong, who has brought his task so promptly to so successful an issue. It is probable that haste has in this instance really been an advantage. It has precluded the heavy style of laborious compilation and exhaustive survey and the authors have been compelled to use mainly their own portable equipment of knowledge and maintain their personal standpoint. This has an excellent result; one feels as if the writers were telling a personal but perfectly impartial story of the subjects in which, so to speak, they have lived. Again, the great dissimilarity of pattern in the articles is a human and refreshing feature; as one reads through the book there is the interest not only of a rapid change of topic, but of a change of treatment. This precious element of individuality is no doubt attended by some cost and it is quite likely that criticisms may be heard of its having led to a certain amount of injustice here and there. To compress an account of modern chemistry and make it readable in 280 pages, by no means closely printed, must entail some sacrifices of what has claim for record. We feel sure, however, that anyone who reads the book through will be left with the dominant feeling of having read a fascinating story. If he has lived as an adult in the chemical world since 1900 he will be profoundly grateful for these authentic summaries. He will, of course, have known at least something of most of it, but with a science increasing as chemistry has done in this span of time the difficulty of maintaining even a general knowledge of movements on the whole front became bewilderingly great.

The sections of the book, following an excellent introduction (probably as difficult to write as anything) by the Editor, number twenty-four and cover a wide territory of knowledge. It is hardly possible to enumerate the topics even summarily, and where there is so much excellence it is invidious to begin on a selection for special praise. We may, however, freely acknowledge the special debt to those brethren who elucidate borderland science. Sir William Bragg writes with his usual art a brief account of the "X-ray Analysis of Crystals" and a longer very interesting and beautifully illustrated chapter on "Crystallography" is contributed by Mr. Barker, with an introductory note by Sir Henry Miers. Professor Andrade, in a dozen pages, has given an admirably lucid summary on "The Structure of the Atom." Among other articles will be welcomed one of interesting reminiscence, "Milestones in Organic Chemistry," by Professor H. E. Armstrong. Professor Thorpe, confronted by the prodigious task of dealing with the "Chemistry of Carbon Compounds," has, fortunately, taken a line of his own and produced an article of extreme interest, the only regrettable feature being the bump with which, from limitations of space or time, it comes to a sudden conclusion. The story of explosives, in three sections, by Sir Robert Robertson, has all the interest of a three-act drama.

The publishers have done their part admirably, and one cannot say that the book is dear. Mr. Woolcock, in an excellently concise preface, says it "is designed for reading by all those, the world over, who have received or are receiving a training in science." It is to be hoped that it will so circulate freely, for it is as stimulating as it is informing. The sad thing is that its contents and all they signify must remain outside the comprehension of the great bulk of the "educated public" of to-day, including those who are most influential in guiding the ship of State. A. S.

Chemical Industry Club and the Dye Agreement

To the Editor of THE CHEMICAL AGE.

SIR,—In reading the report in THE CHEMICAL AGE of last week of the deputation from the Federal Council to the Board of Trade respecting the Anglo-German Dye agreement I noticed with surprise that the deputation included the Chairman of the Chemical Industry Club. What many members like myself desire to know is why the Chemical Industry Club should be dragged into a highly controversial matter of this kind, and whether the Club has ever authorised anyone to lay its views before the President of the Board of Trade respecting an agreement which has never been discussed by the Club members, and which lies entirely outside the province and functions of a purely social club.

It has always been the boast of the Club that it provided a common platform for all classes interested in chemical industry, and that all party and sectional influences were firmly excluded from its atmosphere and from its management. Its success from the start has been due to this policy. Yet matters appear to have so far drifted away from this attitude of strict neutrality that the Club now appears as a party definitely ranged against a business agreement, with which as a club it has absolutely no concern, and about the details of which it knows nothing. Is it not time that the members insisted on a return to the Club's fundamental principle, and on the avoidance of undesirable alliances which may presently result in splitting up a united club into sections and cliques similar to those which abound in other organisations? These points are being freely discussed in private and it is desirable that the fact should be made known.—Yours, etc.

May 12. A MEMBER OF THE CLUB.

Fertilisers and Soil Acidity

To the Editor of THE CHEMICAL AGE.

SIR,—I have read with interest your remarks on fertilisers and soil acidity in your issue of May 3, and also Mr. Bailey's letter of May 6.

Mr. Bailey seems to be under a misapprehension as to the cause of acidity from the use of ammonium sulphate. The free acid in much of the sulphate sold is of negligible importance, and it is the acid formed by the oxidation of the ammonia in the soil that causes acidity.

Ammonia, of course, is not assimilated by plants (except possibly in very small quantities) and it must be oxidised to a nitrate in the soil. For each molecule of ammonium sulphate supplied to the soil there are formed two molecules of nitric acid and one of sulphuric acid. As a matter of fact the oxidation process generally ceases at comparatively low acidity, and further application of ammonium sulphate is valueless because it remains unoxidised. The remedy, of course, is to lime the land.—Yours, etc.,

N. V. S. KNIBBS.

811, Salisbury House, E.C.2.
May 12.

Iron Carbonyl

THE determination of the physical and chemical properties of iron carbonyl is necessary in order that methods may be developed for its elimination in manufactured gas in case it is shown to take part in the formation of gum deposits. Very little is known of the chemical and physical properties of this substance. The literature of iron carbonyl is being reviewed by Department of the Interior chemists at the Pittsburgh experiment station of the Bureau of Mines preparatory to a study of the subject.

Polymerisation of Linseed Oils

Researches by Dr. Newton Friend and Mr. H. J. Alcock

AT the monthly meeting of the Oil and Colour Chemists' Association on Thursday, May 8, the President (Dr. J. Newton Friend) and Mr. H. John Alcock presented some notes on the "Polymerisation of Linseed Oil." This is a subject upon which the two authors have been working for several years, and although their researches are far from complete, the results so far obtained were put forward with a view to stimulating a discussion. In 1911 Ingle directed attention to the fact that linseed oil when heated in an enamelled pan over a flame at a temperature of from 195 to 200° C. gradually thickens. Thus in 43 hours the density of the oil rose from 0·9315 to 0·9800, whilst its iodine value fell from 179·5 to 121. Similar results have been found by subsequent workers, but as Ingle's method was crude, the authors thought it of interest to investigate the problem more closely and to determine the lowest temperature at which any change in the physical properties of the oils could be determined.

Three batches of linseed oil, it was stated, had been used in this research. No. 1 was a pure raw Baltic oil, obtained in 1920, and exceptionally pale in colour. No. 2 was from the same source, but had been kept in a glass stoppered bottle for four years. No. 3 was a sample of fresh cold pressed Azov (Russian) oil. In the experiments the pure raw oil was heated in small glass vessels of a capacity ranging from 50 to 150 c.c. For temperature below 100° C. the flasks were immersed in large water thermostats maintained at constant temperature by the usual thermo regulators. Oxidation was prevented by filling the containing vessels and close corking. For temperatures above 100° C. an oil bath was at first used, and above 200° C. an air bath of special construction was devised, but neither of these arrangements proved entirely satisfactory, and ultimately a special apparatus was devised.

Results of Experiments

Consideration of the data obtained from the tests revealed several interesting features. For instance, the No. 1 and No. 2 oil had increased in density and decreased in iodine value during the four years of storage, the former by approximately 1·5 per cent. It was also apparent that the oil had undergone partial polymerisation on standing, possibly accompanied by, or in consequence of, slight oxidation. No. 1 oil showed a distinct alteration in the neighbourhood of 200° C. both as regards density and iodine number, from which temperature onwards the density increased and the iodine number fell, thus entirely confirming the observations of earlier workers. Whilst, however, the density remained substantially the same below 200° C., the iodine number showed a slight tendency to fall. This was manifested also in No. 2. oil, while the viscosity also showed a slight fall at 50° C., although this did not appear in oil No. 3.

It was thought that these fluctuations might be reflected in the molecular weights of the oil. These were accordingly determined in the usual way, benzene being used as a solvent. It was seen that the apparent molecular weights varied with the concentration of the benzene which was used as a solvent, high concentrations yielding low values and *vice versa*. Such results were usually taken to mean that the solute—in this case the linseed oil—had combined with the solvent, yielding an addition product, stable only in dilute solution, and therefore in excess of the solvent, so that the true molecular weight was not found. Weak combinations of substances with benzene in the presence of excess of the latter body were by no means unknown, as, for example, the compound of benzene and picric acid. There was all the more reason, therefore, the authors stated, to anticipate the possibility of a like union between benzene and such a highly unsaturated substance as linseed oil. From the practical point of view, hydrocarbons were regarded as merely diluents for linseed oil, any drying action being attributed to the mechanical effect in reducing the thickness of the oil or paint coats as usually applied. In view of the above, however, it might well be that with certain thinners, usually regarded as inert, the action was in reality slightly more than mere dilution. It was interesting to note, however, that polymerisation undoubtedly began, with prolonged heating, below 100° C., and became very pronounced above° deg. C.

Discussion

MR. J. HEDLEY BARRY quoted from a letter from Mr. Bruce (chemist to the Greenwich Inlaid Linoleum Co.), in which the writer stated that the important point of the paper, from his point of view, was the definite proof that polymerisation did occur to some extent at low temperatures, contrary to the opinion of many in the trade. He asked if work had been done on the rate of polymerisation of linseed oil alone, and in the presence of pigments, more especially those of a basic nature, such as zinc oxide.

THE PRESIDENT, commenting on a letter he had received from Dr. Morrell, said that the statement that the molecular weights apparently rose with dilution was not new. He had discovered it in 1915, but, owing to the war, his results were not published until 1917. It was interesting, if combination took place between benzene and linseed oil, because it was always possible that diluents which were sometimes regarded purely as diluents might also have a certain mild drying effect. It was not unknown for benzene, although it was a ring compound, to unite with other substances, and since linseed oil was an unsaturated compound direct combination of benzene with linseed oil was perhaps to be anticipated. But that compound only existed with excess of benzene, and when the excess of benzene was reduced the compound broke up. That was what would be expected, that the molecular weight would be greatest at the lowest concentrations and lowest at higher concentrations.

MR. R. P. L. BRITTEN asked whether the combination of solvents of linseed oil was of a chemical or physical nature; he had always regarded it as being purely physical, and of the character of gelation.

THE PRESIDENT said the question whether the combination between solvent and solute was chemical or physical depended upon how the terms "chemical" and "physical" were defined.

Some discussion arose with regard to the gravity of 951·4 given for the pure linseed oil in batch 2, and Mr. Tervet said that, from his own experience, he imagined it should have been about 968 or 970. It was pointed out by the President, however, that practical experience was probably not quite parallel with the experiments he had carried out, because in practical work he did not suppose they could get the oil so free from oxidation as he was able to do in his more refined small-scale work.

MR. H. H. MORGAN commented upon the difficulty of drawing definite conclusions from experiments on such a complex subject. Although they might lay down a certain specification for linseed oil, dealing with iodine value, specific gravity, refractive index, viscosity, saponification value, and so on, difficulties were introduced by other things, such as small quantities of albuminoids and small quantities of moisture, which could not very well be laid down in a specification, but which made an enormous difference in the rate at which the oil would polymerise, and in the relationship between specific gravity, refractive index, and so on. Another factor was the difficulty of determining the exact temperatures of the different portions of oil in a vessel, because linseed oil was a fairly viscous substance, and if they were heating large quantities by direct heat there were considerably different temperature conditions existing in the different parts of the vat of oil. Broadly speaking, there was no doubt that as the oil was heated the specific gravity and the refractive index went up, and the iodine value went down, but if they tried to plot any two of these values together, and to get a linear relationship between the refractive index and specific gravity, refractive index and iodine value, or refractive index and viscosity, they did not reach any definite conclusion. Dr. Morgan agreed that polymerisation became pronounced at about 200° but the polymerisation below 100° must be very slight indeed. He was inclined to think that the difference between experimental and practical conditions was not so marked as had been suggested. As to the acceleration of drying action by hydrocarbons, Dr. Morgan asked if there was any evidence that, by mixing 5 per cent. of a hydrocarbon with a linseed oil or a varnish, drying was accelerated. If it were accelerated, could the President suggest how it acted? Also, as to the suggested combination between oil and solvent, had the President any ideas as to how the compound formation affected the drying of linseed oil? The compound formation depended upon concentration and tem-

perature. The freezing point curve gave evidence of the compound formation at low temperatures and at certain concentrations, but the amount of volatile solvent in high class paints was not much more than 10 per cent., and it was difficult for him to see that there was any prospect of compound formation under those conditions.

THE PRESIDENT said it had been suggested in books he had read that diluents caused paints to dry more rapidly, and it was attributed to the fact that when the diluent was put in they could spread the paint out more. Consequently, when the diluent had evaporated there was a thinner layer, which exposed a larger surface per unit weight. As to compound formation, once it was admitted that a compound could be formed it was simply a matter of degree as to how much of it would be formed when they had their paint with an appreciable quantity of diluent. A third substance, which could unite with either one or other of two mixed substances, frequently enabled other reactions to take place, a sort of catalytic action, which would not take place quite so readily if no combination occurred. Some such action might take place and assist oxidation by having a diluent like benzene, which could combine slightly with the linseed oil.

MR. BRITTEN, referring to the influence of moisture in the atmosphere on the reaction of the diluents, said that with turpentine there was formation of peroxide in the presence of moisture, and also in substances such as camphor oil, acetone oil, and pinene oil, but not in benzene or ordinary hydrocarbons. He believed the oxides were only formed where moisture was present.

British Association of Chemists

Annual General Meeting of the Liverpool Section

AT the annual meeting of the Liverpool Section of the B.A.C on Wednesday, May 7 (Mr. A. Merrick in the chair), Dr. F. W. Kay, the Hon. Secretary, read the report on the section's activities for the year. The chief points of interest were the accounts of the smoking concert held at Rishworth and Dreaper's in Liverpool on February 22, and the exhibition in Widnes and Liverpool to packed audiences of three industrial films dealing respectively with heavy chemicals and coal tar products, the making of Portland cement, and the petroleum industry. Mention was also made of the collaboration in the formation of the group known as the Associated Learned Societies of Liverpool and District, which aims at bringing together all interested in the advancement of learning and culture for mutual support and benefit. The negotiations proceeding between the various chemical societies for the formation of a chemists' club were also detailed and discussed, and it is hoped they will shortly come to fruition.

The committee deplored the poor attendance of the ordinary members at meetings, and the ordinary members present deplored the lack of information as to the work of the council and the policy being pursued by the latter in various matters. The discussion was frank and it is hoped will be beneficial.

Mr. Minton submitted a report of the activities of the Widnes branch committee showing how hard that committee had laboured for the B.A.C., and detailing the criticisms and suggestions for general policy which they had so beneficially brought forward.

The chairman then called upon Dr. Anuden, who moved a special vote of thanks to Dr. Kay on his retirement from the hon. secretaryship. In cordial and generous terms he pointed out how much the section owed to Dr. Kay since its beginning and the general regret that the pressure of other duties no longer left him the necessary leisure for the duties of the post. Mr. Mansbridge being called upon to second the motion did so in terms of equal appreciation and regret, and the motion was carried with acclamation. Dr. Kay responded briefly to this motion of which he had had necessarily no previous warning.

The following officers for the ensuing year were then elected: —Chairman: Mr. A. Merrick, B.Sc.; Hon. Secretary, Mr. R. E. Bath, 2, Manton Road, Fairfield, Liverpool; Hon. Treasurer, Mr. W. Mansbridge, "Dunraven," Church Road, Wavertree, Liverpool; Committee, Messrs. S. C. Bone, C. A. M. Forster, M.Sc., Joseph Garton, G. S. Irving, F. W. Kay, Ph.D., W. H. Miles, F. B. Small, G. H. Stott, C. A. Wylie, T. G. Seymour.

Society of Public Analysts

AT an ordinary meeting of the Society, held at the Chemical Society's Rooms, Burlington House, on Wednesday, May 7, Mr. G. Rudd Thompson, President, in the chair, certificates were read for the first time in favour of Messrs. J. E. Nyrop, Cand. Polyt. (Copenhagen University), and C. P. Thorpe, B.Sc. (Manch.). Certificates were read for the second time in favour of Messrs. G. W. Clough, D.Sc. (Birm.), J. P. Shenton, F.I.C., and W. S. Wood. The following were elected Members of the Society:—Messrs. J. J. Bryant, F.C.S., E. W. Deag, H. W. Hewis, B.Sc. (Lond.), A.I.C., E. W. Jackson, F.I.C., T. McGrath, and A. Scholes, F.I.C.

Abstracts of Papers

In a paper on the "Estimation of Sugar in Urine by means of Fehling's Solution with Methylene Blue as Internal Indicator," by J. H. Lane, B.Sc., F.I.C., and Lewis Eynon, B.Sc., F.I.C., it was pointed out that sugar in urine could be accurately estimated by means of Fehling's solutions with methylene blue as internal indicator, provided the urine be first rendered neutral to litmus. Defecation of the urine with normal lead acetate and removal of the excess of lead with potassium oxalate enables a sharper end-point to be obtained. This treatment does nor remove any reducing sugar, but removes a small amount of reducing non-sugar substances (equivalent to about 0·02 to 0·03 per cent. of dextrose). The results obtained by the method agree closely with those given by Gerrard's cyano-cupric method, but are considerably lower than those given by Pavy's method, this being attributed to non-sugar substances being estimated in that method. Methylene blue can also be used as an internal indicator with Pavy's or with Benedict's solution.

A description was given by J. J. Considene, in a paper on "Simple Forms of Hydrogen Electrode," of the construction and method of using three simple forms of hydrogen electrode which can be readily made from apparatus used in every laboratory. One of these is an electrode for general use, the second a "micro" modification of this, and the third a modification of the capillary form of electrode, which has been found useful for fluids of low conductivity.

A "Note on the Recognition of Hydrogenated Oils" was presented by K. A. Williams, B.Sc., and E. R. Bolton, F.I.C. During the hydrogenation of oils iso-oleic acid is formed. This acid does not occur in nature; it is an isomer of oleic acid, has an iodine value of 90, and is characterised by the insolubility of its lead salt in organic solvents, in this respect resembling the saturated fatty acids and not the unsaturated ones. The authors suggest that for the detection of hydrogenated fats the iso-oleic acid content of the fat should be determined. This is done by performing the ordinary lead salt ether separation of the fatty acids (details of which were given) by which the iso-oleic acid is separated from all other unsaturated acids, and appears in the fraction containing saturated acids; in this it is estimated from the iodine value. The effect of the use of various solvents for the separation is recorded, methylated ether or alcohol being recommended. Figures are given which show the amount of iso-oleic acid to be expected in fats hydrogenated to various degrees, and examples of the application of the method are discussed.

In some notes on the "Analyses of Milk Powders and Condensed Milks," by Dan W. Steuart, B.Sc., it was stated that the citric acid content of full cream milk powders averaged 1·16 per cent. and of skim milk powders 1·55 per cent., equal to about 0·144 per cent. of anhydrous citric acid in the original milk. The citric acid content of pure milk products is equal to about one-fifth of the ash. Analyses of milk powders and condensed milks are given. Lactose is estimated by the reduction method of Lane and Eynon (using methylene blue as an internal indicator), after removing the protein and lime.

Change of Nitrate Company's Headquarters

A MEETING of the New Tamarugal Nitrate Co., Ltd., is called for 2.30 on May 20 at Winchester House, at which it is proposed to insert a new group of articles, under the heading "Local Management," which provide that the Chilean business (including the raising and borrowing of monies and incurring of debts and liabilities) shall be carried on and managed by a local board, and that to the exclusion of the board of directors in the United Kingdom.

The Industrial Revolution (II.)

A Common Fallacy Examined and Exposed

By Sir Ernest Benn

WHEN the politician or the doctrinaire starts talking about industry or trade he always gives you, by way of introduction, a little picture of what he is pleased to call "the industrial revolution." He presents the picture with many graphic emblishments of suggestion, inference or positive assertion—invariably resting on an utterly unsound basis, and certainly with little appreciation of the real facts—in a manner calculated to create in the minds of his hearers a deep impression that the industrial revolution was a crushing, debasing movement which brought people from comfort on the land and reduced them to far worse conditions in the slums of our cities and towns. It is perfectly astonishing how the public as a whole appears to have accepted the theory that the story of the early part of the last century is the sort of story that may be classified with that of Siberia under the Czars. One gets a long catalogue of horrors in which there invariably figures the story of children of seven doing night work in the factories, and we are invited to believe that the manufacturer of a hundred years ago was a greedy, grasping individual, driving his workers like slaves, pretty much as the boss of a plantation in the tropics might be supposed to treat his army of nigger workers. That always seems to me to be a thoroughly unjust picture of what was in fact the greatest forward movement that the world has ever known.

Testing the Inference

The inference drawn from this all too common introduction is that the employer or the trader of to-day would do exactly the same if he had the chance. The way to test this is to apply the same methods to other fields. Supposing, for instance, that we were to take the parson of a hundred years ago—the parson of the hunting, drinking, Society kind, the typical Reverend Mr. Tozer—and we were to analyse him in detail and then hold him up as a real index to the inner mind of the Church to-day. Or take education. What would be said if the critic of our educational system argued by the true story of such schools as existed in the early part of the nineteenth century? Those institutions, for the most part, could be truthfully described as a concentrated mixture of all the horrible characteristics of the worst type of lunatic asylum, criminal prison and baby farm combined. Would anybody be so foolish as to devote his attention to this phase of the educational movement and then from that argue that education should be abolished? Turn to the theatre, and ask who would think of suggesting that any conclusions about the theatre to-day could be safely based upon what happened on the stage a hundred years ago. The same methods applied to any branch of human activity would produce a like result.

There is the idea, which I mentioned earlier—and which one can gather not only from Socialist text-books but from many pulpits—that before the days of the factory system the people of this little island lived in comfort on the land. We are given beautiful illustrations of may-pole dances. Life was, it seems, made up of poetry, sunshine and happiness. A typical picture of the milkmaids or the ploughmen following their heaven-sent callings in the intervals of attending church is to me about as true as that of the "artistic" soldier joyfully galloping to the charge on a white steed with gold trappings. All those pictures are misrepresentations and will not stand a minute's serious thought on the part of any one of us. The simple fact is that a hundred years ago men lived and died on the land without so much as tasting a piece of meat, unless as poachers they snared a rabbit. Life to many of them was one miserable round of manure and melancholia; rheumatism, mental stagnation and human rot were its characteristics.

The "Comforts" of the Land

If it is really desired to know the joys and the comforts of the land of a hundred years ago it is only necessary to make a careful examination of Ireland or Brittany or many other typically agricultural districts to-day. It cannot be that life on the land in 1924 is less civilised than it was in 1824. Even in these enlightened times mud huts are the usual thing in Brittany. The Surrey village through which the motorist sweeps with a camera and professes to find picturesque will disclose, if one cares to look for them, living conditions that are far worse than any to be found in the slums of Glasgow or the East End of London. Inter-marrying is common on the English countryside, while such things as sanitation or water supply are still unknown in many places. One could enlarge on these "joys and comforts of the land," but it is unnecessary to do so. It was from conditions like these that the people, of their own free will, flocked in their thousands to the infinitely superior conditions then offered by the buildings in the factory towns which have since become slums.

To get this story of the industrial revolution into its right perspective we have to remember that there has in the interval been an intellectual revolution which followed, and is indeed a consequence of, the industrial movement. The grouping of people together in towns made human intercourse a real daily experience instead of a rare occurrence. It is perhaps characteristic of human ingratitude that those who owe their mental and spiritual development to the wonders of the industrial revolution should now turn round and curse it.

The factory system opened the way for large numbers of people to start afresh under conditions which provided some degree of order, regularised employment, and led to a marked improvement in health, better wages and a higher standard of living. On the question of health, Mr. W. E. Hickson, an Assistant Commissioner in the textile industry, who gave evidence before the Commission on Hand-loom Weaving in 1840, said: "Having seen the domestic weaver in his miserable apartments and the power-loom weaver in the factory, I do not hesitate to say that the advantages are all on the side of the latter." Mortality figures at the beginning of the nineteenth century show that more than 50 per cent. of the children died before reaching the age of five years. Professor Knowles says that under the domestic system children were driven by parents and suffered frightful overwork under squalid conditions. Each child had to be self-supporting from the age of three years. In his *Notes of a Tour in Lancashire* (1842), Cooke Taylor wrote of a man who referred to the days of his boyhood in 1770 as "days of infant slavery," when children were set to work as soon as they could crawl. Comparing the factory system with domestic work he said that "parents were the hardest of taskmasters."

An Uplifting Movement

Some of us now living are old enough to remember personal experiences when children "should be seen and not heard," when solitary confinement was supposed to be good for a child, when whippings and oppression were part of the daily routine, and when cake was reserved as a matter of course for birthdays or Sundays. These things are all forgotten by the present generation. The march of public opinion in the matter of the upbringing of children has been phenomenally rapid within our own lifetime and we calmly forget or ignore this, and proceed to judge the parents of a hundred years ago by the standards of the ultra-modern world in which we ourselves live and move and have our being. It is perfectly absurd to suggest that the habits and customs of these people had anything to do with economics or with capitalism or with industry. The industrial revolution was merely using the human beings that existed at that time in the way that they themselves decided that they should be used and thought to be right.

As I see things, the truth is that the industrial revolution was wholly and entirely an uplifting movement, bringing with it nothing but blessings; that it enabled us, as we promptly proceeded to do, to multiply ourselves fivefold and still be able to live in a country which grows next to no food; that it gave to every succeeding generation advantages beyond the wildest dreams of its fathers; and, last and most wonderful miracle of all, that it has enabled us to develop to the point when we can see new and unsuspected advances still to be made. A rational course in such circumstances would seem to be to carry on with the good work.

Case-Hardening with Cyanide

A Process Growing in Popularity

MR. H. R. HEMS, of the Industrial Research Laboratories of the Birmingham Gas Department, read a paper on "Gas Furnace Installations" (with special reference to the metal industries, cyanide hardening, and japanning and lacquering), before the members of the Midland Junior Gas Association at the annual meeting held at the Birmingham Council House on Thursday, May 1. Dealing with cyanide hardening Mr. Hems stated that in addition to oven furnace for case-hardening processes, a large number of manufacturers are turning their attention to the cyanide process of case-hardening, and the Research Laboratories of the Birmingham Gas Department are obtaining a number of inquiries for this class of furnace.

Rapid Results

Briefly stated, the cyanide process gave a slight depth of case very rapidly, the articles to be treated only having to remain in the molten cyanide a period varying from four to ten minutes to obtain the depth of case found to be adequate for many of the parts of cycles and motor cycles, whereas in the older pack-hardening method these same articles would have remained in the carburising compound from the time of filling the boxes to quenching out—a period of at least two or three hours. The Department had several interesting installations of furnaces for this particular class of work. Low pressure gas was found inadequate for pots of any size over about 12 in. deep by 8 in. or 10 in. diameter, as the cyanide mixture had to be kept at a temperature of 850° C., and needed to keep up to a rapid input and output of work. One installation in Birmingham consisted of a number of small pots placed into a specially constructed setting similar to that used in the low-pressure oven furnace. The remaining installations all consisted of the deep bowl pot fixed into a brickwork setting shaped to the pot and roughened surface. In the earlier furnaces of this type the flames and products emerged round the top of the pot, and the products were taken away through the canopy flue provided for carrying the cyanide fumes away. With this method it was found that the ordinary tendency of cyanide to "creep" was intensified owing to the temperature being kept up, thus great trouble was experienced with stopped up burners and brickwork settings replacements. They had now completely separated the heating arrangement from the cyanide take-off, with considerable improvement. They were continually experimenting, and were in touch with the makers of pots and cyanide producers with a view to obtaining an improved design of furnace. The pot life has been a very serious item against the use of cyanide, the average M.S. pot only giving about 85 hours life. Pots made of nickel-chrome steel alloys had, however, been used successfully.

The lecturer also described types of japanning and lacquering stoves.

Purification of Water and Sewage

AT an ordinary meeting of the Junior Institution of Engineers, on Friday, May 9, the Durham Bursar's paper "Methods of Purifying Water and Sewage," by Mr. F. W. Follett, was read. Referring to the use of sand filters for water purification Mr. Follett said that the most important rule to be observed when considering the bacterial efficiency of sand filters was the maintenance of a fixed head of water, and of an unbroken film of fine matter on the surface of the sand. If this rule was not observed for any reason the efficiency would immediately be affected, and it was usual for water-supply authorities to maintain a bacterial laboratory, the staff of which kept a regular watch on the results from each filter. The vast area covered by slow sand filters made their use impracticable in most industrial undertakings, although their use was almost universal in water supply companies.

The portion of the paper dealing with sewage purification contained descriptions of the broad irrigation, intermittent filtration, mechanical purification, and artificial biological purification methods, as well as sterilisation by ozone and chlorine. The activated sludge process, Mr. Follett said, was, briefly, the complete oxidation of the sewage in tanks. Diffused air was passed through the liquid sewage until the solid matter that was held in suspension had reached a high state of bacterial activity. The sewage was then allowed to settle and the clear effluent drawn off. A certain amount of sludge was always kept in the tanks, and the sewage passed through slowly and kept intimately mixed with the sludge by blowing. In this way the sewage was thoroughly aerated and oxidised. This process was effected without the use of bacterial filters. The paper was illustrated by many slides showing water purifying and sewage disposal plant, including the bio-aeration plant at Sheffield.

An American Chemical Exposition

Ambitious Plans for Next Year

THE Tenth National Exposition of Chemical Industries, which will be held in New York, September 28 to October 3, 1925, is expected to be the most extensive chemical and scientific exhibition ever held in the United States. The aim is to secure over five hundred exhibitors, the largest previous record for the American Chemical Exposition being 425. Although representatives of industries outside of the United States have always been present in large numbers at former Chemical Expositions, redoubled efforts will be made to increase the number of foreign buyers of industrial chemicals and chemical equipment. The 1925 Chemical Exposition will be America's biggest offer of the products of her chemists and engineers to industry all over the globe. As the exhibition to be held next year is the tenth anniversary of the holding of the original one in 1915 under the same management, preliminary arrangements naturally call for the "greatest chemical exposition."

A constant expansion in the type of products shown at the Chemical Exposition has been noted from year to year. Chemicals, from the heaviest type of industrial product down to the finest of synthetic aromatics; dyestuffs, products of the American industry since the termination of the war; equipment, including every type of chemical engineering apparatus with the latest developments; engineering instruments; accessories, such as the newer things in barrels, carboys, tanks, drums, automatic weighing and filling machinery, acid-proof floorings, and numerous others: these make up the main body of products which will be on display. The materials on exhibition will be the output of some five hundred companies from the largest organisations in the country to some of the smaller specialists.

In conjunction with the 1925 Chemical Exposition, many of the American chemical and associated scientific societies will hold meetings. Technical men will meet with the executive and sales forces for discussions of production and distribution problems. Lectures and motion pictures on chemical subjects, or on the chemical consuming industries, given by prominent authorities, will be a part of the programme each day and evening during the week of the exhibition as in past years. One of the big features for the 1925 Exposition, however, expanding on an idea originating in 1923, will be a one-week intensive course in practical chemical engineering for a thousand students of chemistry and chemical engineering from the colleges. Leaders in the various fields of chemical engineering practice in the United States will conduct the short course for the students. A glimpse into the business side of their profession is the plan of the special gathering of students. A series of educational exhibits, showing various phases of the newer chemical developments and the application of chemistry to the solution of numerous industrial problems, are to be worked out on a broad scale.

Showing the progress of the American chemical and equipment industries, as well as their products, to the buyers of the world, and the relation of chemicals, chemists and chemical engineering to everyday business and industry, will be the main objectives of the Exposition planned for next year. The management, which has conducted every Chemical Exposition in the United States since the beginning in 1915, will again be under the International Exposition Co., New York.

American By-Product Development

THROUGH a new system of multiple unit retorts, gas, gasoline, tar dyes, sulphate of ammonia, potash and ammonia will be extracted from lignite near Kelso, Washington, U.S.A. The process also will be used to extract turpentine, creosote and wood alcohol from waste of logging camps and sawmills in Oregon and Washington. The American By-Products Co. has been financed for the purpose.

Reparation Dyestuffs Distribution

Text of Agreement With the B.D.C.

In the House of Commons on Tuesday, May 13, Mr. Black asked the President of the Board of Trade what the values of German reparation dyestuffs received by this country were for the years ending April, 1923 and 1924; and whether the terms of agreement with the British Dyestuffs Corporation alluded to in paragraph 9, page 216, of Trading Accounts and Balance Sheets, 1921 and 1922, could be laid upon the Table of the House.

Mr. Webb said that the value of German reparation dyestuffs received by this country during the year ended March 31, 1923, was £301,400, and in the year ended March 31, 1924, approximately £194,000. The terms of agreement with the British Dyestuffs Corporation were set out in a letter to the Board of Trade from Sir W. Alexander, chairman of the B.D.C., dated August 18, 1922, in which he stated :—

We are prepared to conclude the following arrangement with the Board for the distribution of reparation dyestuffs :—

(1) We will act as your agents for the distribution of reparation dyestuffs as from September 1, 1922, and we will sell the stocks at that date and the future supplies of such dyestuffs.

(2) We will receive the dyestuffs at Cologne or at some other convenient place, check the deliveries, and arrange for their transport to the United Kingdom and into warehouse at our expense.

(3) We will store the dyestuffs in the United Kingdom at our expense.

(4) We will establish a separate department for the distribution of the dyestuffs, and we will provide the necessary office accommodation and staff and we will keep a separate set of books.

(5) We will invoice the dyestuffs and collect payments, and we will pay the Board on the last Friday in each month the sums due in respect of goods sold during the preceding month, subject to paragraph 11. We will accept the responsibility of giving credit.

(6) We will act, subject to any existing agreements or to the requirements of the Indian and Dominion Governments, as distributors of the dyestuffs throughout the British Empire.

(7) All books relating to the distribution of the dyestuffs and all relevant documents will be open to the inspection of the Board at any time, and all explanations will be forthcoming.

(8) The prices at which the dyestuffs will be sold in the United Kingdom will be fixed by the Board or their nominees and these prices will be those charged to consumers.

(9) The Board will use their best endeavours to place all information with regard to the method of working the present Central Importing Agency at our disposal.

(10) The Board will arrange that we shall be represented at discussions in connection with the Reparation Commission dealing with reparation dyestuffs.

(11) We will receive for our services 6½ per cent. commission on the turnover, with an additional 1 per cent. for guaranteeing payments. The Board, subject to the production of proper accounts, will also make an annual contribution not exceeding £30,000 payable in monthly instalments towards the cost of freight, warehousing charges, repacking, materials for repacking and internal transport charges. The commission and the contribution will be deducted monthly by us from the amounts payable under paragraph 6.

(12) In the event of the Treasury adopting a scheme for utilising reparation dyestuffs for the benefit of the British dyestuff industry, the arrangement covered by this letter may be modified by mutual agreement. In any event, it may be cancelled by the Board or by ourselves by three months' notice in writing given at any time.

(13) With the sanction of the Board of Trade, and at prices to be mutually arranged, the Corporation may purchase for its own account, for re-working or disposal, parcels of reparation dyestuffs.

Anglo-German Combine

Mr. Waddington asked the President of the Board of Trade whether any statement had been presented to the Government on behalf of the B.D.C. which embodies the heads of the proposed agreement with the German combine; and whether, before such agreement could be further advanced, the approval of the Government would be given to such statement?

Mr. Finney asked the President of the Board of Trade whether an agreement made between the B.D.C. and the I.G. was under consideration by the Board; and, if so, could he indicate the policy of the Government in regard to this arrangement?

Mr. Webb: I understand that negotiations between the parties to the proposed agreement are still continuing. The Government has been made aware, in outline, of the terms now being further considered, and these are being carefully examined. Until that examination has been completed, I am not in a position to make any statement on the subject.

Mr. Waddington: How long have the Government had this outline of the agreement in their possession?

Mr. Webb: I am not able to say that, because the outline has shifted from moment to moment, and consequently it is not possible to give an exact date.

Mr. Sandeman: Can the right hon. gentleman give us any idea when we are going to get some information about this question, which is causing a great deal of unrest in the industry?

Mr. Webb: The Government are not a party to the negotiations, and we have no authority to intervene except with regard to the exercise of the power given to us under the Charter, which can only be done when an agreement has been reached.

Mr. Sandeman: Do I understand that no agreement will be made without this House being consulted?

Mr. Webb: I cannot say that, because we are not parties to the agreement. I can say, however, that no action will be taken to put in force the powers of the Government without this House having notice.

Sir H. Brittain: May we take it that nothing in the nature of a monopoly will be forthcoming out of this agreement?

Chemical Matters in Parliament

Pitch Lake Concessions, Trinidad

Mr. Barnes (House of Commons, May 8) asked the Secretary of State for the Colonies whether the terms of the Crown concession granted to Mr. J. W. Previté, Mr. H. A. Grieg and the New York and Trinidad Asphalte Co., for Trinidad Lake asphalte (pitch lake), permit of a monopoly being created in the United Kingdom.

Mr. Thomas: The lease granted by the Government of Trinidad covered the whole area of the Pitch Lake in Trinidad. No conditions regulating the sale of asphalt were included in the terms of the lease, but I see no reason to suppose that the concession would have the effect indicated.

Safeguarding of Industries Act

Sir J. Simon (House of Commons, May 12) asked the President of the Board of Trade whether he was aware that a consignment of sodium phosphate arrived at Millwall Docks on April 5 last and, although the importer made a free entry in respect of the goods, the dock officers demanded that a sample should be taken; that it was not until four days later that the goods were released as being non-dutiable, and during that period the goods were in a barge on which there was heavy demurrage; and, in view of the fact that 60 per cent. of the consignments of chemicals held up, pending the result of the test by dock officers, were ultimately found to be not liable to duty under the Safeguarding of Industries Act, whether some better arrangements could be made for the quick transit of samples from the docks to the laboratory, in order to avoid delay and consequent financial loss to importers, who have to pay demurrage on barges while goods are held up?

Mr. Graham: I regret that delay should have occurred in this case, and steps are being taken to obviate any recurrence. I would, however, point out that the four days mentioned included a Saturday and Sunday.

Lead Paint Bill

Sir P. Lloyd-Greame (House of Commons, May 12) asked the Home Secretary whether it was the intention of the Government to ratify the White Lead Convention; and, if so, whether, and on what occasion, the Government proposed to obtain the approval of the House of Commons to such ratification?

Mr. Davies: The Government have introduced the Lead Paint Bill with the express purpose of giving effect to the provisions of the draft Convention, and if Parliament accept the Bill and pass it without any amendments inconsistent with the Convention, it is proposed to ratify the Convention.

Mr. Thomas (House of Commons, May 13), replying to Sir W. Mitchell-Thomson, who asked whether in the event of H.M. Government ratifying the International Labour Convention regarding the use of lead paint such ratification would be binding to the Crown Colonies, said that on the ratification of the Convention it would be applied to the Colonies and Protectorates, subject to the provisions of Article 421 of the Treaty of Versailles.

Stone Preservation

Sir John Brunner (House of Commons, May 12) asked the First Commissioner of Works whether, in view of the large amount of money which was annually expended on repairing stone work of national buildings, he was carrying out any research work to find a suitable preservative material.

The First Commissioner of Works (Mr. Jowett): The Department of Scientific and Industrial Research has appointed a Committee, with a research staff, to investigate the whole problem of stone decay and the possibility of its prevention.

Trinidad Lake Asphalte

Mr. Gosling (House of Commons, May 13), in reply to Mr. Cluse, who asked whether the Minister of Transport had any information as to the creation of a monopoly in the United Kingdom for Trinidad Lake asphalte, and whether he would make inquiries as to whether there were any restrictions placed upon the use of this material, and with what object, referred him to a previous answer on the subject, and said that if Mr. Cluse wished to bring any specific points to his notice, and would communicate with him, he would be happy to consider them.

Alleged Tar Works Nuisance

An action alleging nuisances caused by the tar distilling works of Major and Co., Ltd., Sculcoates, Hull, was decided by Mr. Justice Eve in the Chancery Division, on Thursday, plaintiffs being the trustees of the adjoining municipal almshouses in Northumberland Avenue, Hull, which it was alleged had been injured by the discharge of tar from defendants' works and by the emission of noxious vapours and fumes. Mr. Clayton, K.C., and Mr. Errington represented plaintiffs, and Mr. Manning, K.C., and Sir Robert Aske appeared for the defendants.

The almshouses were built in 1886 and accommodate 127 poor people.

Evidence was given to the effect that the fumes from defendants' works caused nausea, sickness, coughing, and eye trouble to the inmates of the almshouses. Defendants said that they had spared no expense to bring the works up to date, and that the fumes had been rendered innocuous. Mr. John Lewis Major, chairman and managing director of the defendant company, gave evidence, stating that normally there was no escape of vapour from the works except when there was an accidental breakage of a pipe or a still explosion.

Giving judgment, his Lordship said he would not treat the action as one for nuisance by noise. He could not grant an injunction to restrain people for carrying on a business without accident. There would be an injunction to restrain defendants from carrying on their works in such a way as to cause a nuisance by the fumes and vapours arising from the pitch when cooling or otherwise and by the discharge of tarry and other substances from the pipes conveying the same to, through, and from defendants' premises. There would also be an inquiry as to the damages sustained by the discharge and spraying of the tar, and liberty to apply generally for an injunction with respect to these matters. Defendants would pay the costs of the action.

Fertiliser Alleged Unsuitable

On Thursday, in the Commercial Court, King's Bench Division, Mr. Justice Bailhache had before him an action by Messrs. Pattullo Higgs and Co., Ltd., of High Street, Orpington, Kent, against the Continental Guano Works, Ltd., of Dock House, Billiter Street, E.C., claiming damages for alleged breach of contract and breach of warranty upon the sale of a fertiliser known as granular nitrolim. Plaintiffs said they purchased the fertiliser, believing it to be possessed of certain characteristics reasonably fit for a particular purpose. Plaintiffs purchased some 120 tons of the fertiliser at a total cost of £1,257, believing it contained valuable nitrogen in a form proper and suitable to be mixed with certain other ingredients. They alleged that it was not as warranted. Defendants denied that there was any express warranty or implied and that the fertiliser was in accordance with contract. Defendants also said it was not made known to them the purposes for which the plaintiffs required it, that none of the ingredients in the manure were mentioned, and further that there was no implied condition as to its fitness for any particular purpose.

Evidence was called and the hearing adjourned.

Chilean and Synthetic Nitrate

At the annual general meeting of the Salar del Carmen Nitrate Syndicate, Ltd., in London, on Thursday, May 8, the chairman of the company in the course of his speech referred to the uses of nitrate of soda. Although it was used more for agriculture than for any other purpose, yet quite a considerable proportion of the total output—26 to 30 per cent.—was employed in various chemical and industrial concerns. For example, it was used in the manufacture of dynamite and other high explosives, of glass, glassware, steel and artificial silk; it was employed in the purification of caustic soda; for fluxing material in the extraction of metals, and for making colour pigments used in paints. Unquestionably, slackness and depression have existed during the last two or three years in these trades, yet, in spite of it, the nitrate industry had done exceedingly well.

Referring to synthetic nitrogen products, he said that so far as the past twelve months were concerned the German output in the year ended April 30, 1924, was considerably reduced as compared with the previous year. The demand for nitrogen products has been greater than the supply, but dealers in Chilean nitrate of soda had been able to do very little business with the German buyers owing to the difficulty of converting the rentenmark into sterling. In Norway, owing to strikes, it was reported that manufacturers of nitrate of lime who had sold ahead had been unable to deliver about 25,000 tons in time for this season's use, and an increase in Chilean nitrate business had consequently taken place in Scandinavia. In France the Government have voted a substantial sum of money for the exploitation of the Haber process, but it was not expected that the plant would be ready for two or three years. In the United Kingdom, at Billingham, it was understood that the Brunner Mond plant had almost reached the production stage.

It might be thought that this list of possible competitors was a formidable one—and indeed it would be if demand for nitrogen in its various forms stood still, but it did not stand still; the tendency was always to increase, and it would probably increase very largely as time goes on.

Chemical Workers' Wages

A case of interest to the chemical trade came before the Industrial Court on Tuesday, when the claim of the trade union—for another penny an hour for day workers and three-halfpence for shift workers, and for week-end work to be paid at double instead of time and a half—was investigated. The workers' case was put by the officials of the workers' side of the Chemical Trades Joint Industrial Council. It is based on the inadequacy of the present wage, on the reductions that have been made during the last two or three years, and on the financial ability of the industry to meet the claim. The employers' case was presented by Mr. Lloyd Roberts, of Messrs. Brunner, Mond and Co., Ltd., who opposed the claim on the ground that concession of the claim would imperil the stability of the chemical industry and would react unfavourably on other industries. He also held that foreign competition was severe, that the employers had responsibilities to the shareholders and to the consumer as well as to the workpeople, and that the existing rates of pay were reasonable. It was stated that if the existing plant was employed to its full extent it would provide for the employment of 34,000 workpeople as against the 22,000 at present employed and covered by the claim. The claim affects the wages of about 2,000 workpeople, chiefly in Lancashire and Cheshire.

The president (Sir William Mackenzie) will give his award in about a week.

Conference on Science and Labour

The Prime Minister is to open the Conference on Science and Labour to be held at the British Empire Exhibition on May 30 and 31. The principal speaker at the first meeting will be the President of the Board of Trade (Mr. Sidney Webb), the subject of discussion being "The Place of Science in Government." Miss Margaret Bondfield, M.P., will preside at the meeting on Saturday morning, at which "Science and the Human Factor" will be discussed, and Mr. Arthur Greenwood, M.P., will preside at the Saturday afternoon meeting, the subject being "Science in Educational Organisation."

From Week to Week

MR. W. F. WYATT, B.Sc., has been appointed demonstrator in chemistry in the University of Sheffield.

MR. H. J. E. DOBSON, B.Sc., London, has been appointed Lecturer in Chemistry at the University of Durham.

MR. BERNARD SMITH, M.A., of Sidney Sussex College, Cambridge, has been approved for the degree of Doctor of Science.

THE PAPER recently read before the Society of Public Analysts by Mr. M. S. Salamon, B.Sc., on a plea for standardisation in chemical analysis has been reprinted as a pamphlet.

A DONATION OF £100 from the United Alkali Co., for the benefit of the Agricultural Department, was acknowledged with thanks at a meeting of the Council of Armstrong College, Newcastle, on Monday.

THE PRICE OF INSULIN was reduced on Monday by the British Drug Houses, Ltd., Boots' Pure Drug Co., Ltd., and Burroughs Wellcome and Co., from 6s. 8d. to 4s. 8d. per ten doses of 100 units. This works out at about 5½d. per dose.

INCLUDED AMONG THE MEMBERS of the Drafting Committee appointed by the Federation of British Industries to prepare the evidence the Federation has been asked to give before the Government Committee on National Debt are Sir Alfred Mond and Sir Max Muspratt.

DR. A. K. MACBETH, D.Sc., Belfast, has been appointed Reader in Chemistry in the Durham Colleges. He has been Lecturer in Organic Chemistry and acting head of the Chemistry Department at Belfast University, and Senior Lecturer in Chemistry at the University of St. Andrews.

A DELEGATION OF LEADING British engineers is touring the United States with a view to learning how the smoke problem in cities is dealt with. Among the places which the delegates will visit are the Ford Motor Works at River Rouge, where the largest high-duty boilers in the world burn pulverised fuel.

DR. L. B. FELTON, of Harvard University, U.S.A., announces the discovery of an effective anti-body for pneumonia, which consists of a white crystalline powder containing sulphur and phosphorus, and which may be classed as a globulin. It is also stated that the substance could easily be produced in large quantities.

A NEW PROCESS of refrigeration which it is claimed will supersede the system now employed for transportation of perishable merchandise has been successfully tested at Montreal. Carbon dioxide gas is used in place of ice, with a saving of time, space and labour. Further tests will be made by the Department of Marine and Fisheries.

AT THE OPENING of the spring session of the Iron and Steel Institute at the Institution of Civil Engineers, London, on Thursday, May 8, Professor Albert Sauveur was awarded the Bessemer gold medal in recognition of the valuable services he has rendered to the science of metallurgy and the special branch of metallography in particular.

ACCORDING to the report of H.M. Inspectors of Explosives for 1923, the total number of accidents at factories and magazines reported during the year was 428, causing 37 deaths and injuries to 437 persons. The total number of accidents was above that of the previous year, being 428 as against 380. The number of deaths, however, was less—37 against 52.

AT A MEETING of the Institution of Petroleum Technologists, held in London on Tuesday, Mr. R. K. Richardson read a paper dealing with the geology of South-west Persia in connection with the oil deposits. He pointed out that oil was found throughout the range of strata, and the problem of how this had come about required further consideration before it could be solved.

THE ROYAL HUMANE SOCIETY has awarded a bronze medal to Arthur A. Hebberts, a stoker at the works of the Midland Tar Distillery Co., Oldbury, for attempting to save the life of Walter Heap, who was accidentally suffocated by gas in a tar still in which he had gone to work. A fellow-workman, George Challis, also attempted the rescue, but lost his own life, and a testimonial is to be sent to his relatives.

THE DEATH IS ANNOUNCED of Professor H. T. Burls, the eminent geologist who was stated to have discovered the process for eliminating sulphur from Dorsetshire shale oil. Mr. Herbert, the chemist who assisted him, explains, however, that though at one time it was believed elimination had been achieved, subsequent investigation showed that this was not the case and the problem still remains unsolved.

A MEETING OF THE Executive Committees of the societies in the dyeing industry was held in Manchester on Thursday, May 8, to consider a proposed application for an advance in wages for all dyers and finishers throughout Yorkshire, Lancashire, Cheshire, and Derbyshire. It was decided that an immediate general application be made for an advance on base rates and variations in the present cost of living sliding scale arrangements.

DR. CHARLES L. REESE, chemical director of E. I. du Pont de Nemours and Co., of Wilmington, U.S.A., has retired from the active duties of that post, although he will remain in a consultative capacity. Dr. Reese's connection with the du Pont organisation extends over 22 years. His successor as chemical director will be his former assistant, Dr. C. M. Stine, who has had much to do with the development of the dyestuffs side of the company's work.

INTIMATION HAS BEEN received by the financial general secretary to the Glassworkers' Union, that in view of the announcement that the Government do not intend to prolong the provisions of the Safeguarding of Industries Act, no good purpose would be served by sending a deputation to the Board of Trade to lay before that Department the serious position in which the glassworkers would be placed by the discontinuance of the McKenna duties.

THE MANAGERS of the Nita King research scholarship have appointed Mr. John Mills, M.B. and Ch.B., of Manchester, now a research student at Caius College, Cambridge, to the research studentship for a further period of three years. At Emmanuel College, Cambridge, the Sudbury-Hardyman prize of £30 has been awarded to Mr. W. Smith, B.A., Beit Memorial research fellow, and formerly scholar of the College, for a dissertation entitled "Studies on carbohydrate metabolism and the action of insulin."

AT THE ANNUAL DINNER of the Institute of Brewing at the Hotel Cecil, on Friday, May 9, Mr. C. Grant Robertson, principal of Birmingham University, in proposing the toast of "The Institute," urged the industry to see to it that its young men were trained in the sciences underlying its activities. The president (Mr. Robert Valentine Reid), responding, said that science, as applied to their industry, was totally misunderstood by the ignorant, but fortunately the industry was awakening to the advantage and necessity and also the friendship of science.

AT THE INQUEST HELD at Oldbury, on Wednesday, May 7, on two victims of asphyxiation, in an accident at the Midland Tar Distillers, Ltd., it was stated that one of the victims lost his life in attempting to rescue the other. Another rescuer became unconscious for several hours, and he stated at the inquest that he had not waited to put on a respirator, as he did not smell any gas in the tank where the man was. The coroner remarked that though there was a regulation that respirators should be worn even in cases of rescue, he was proud to think that the better stamp of Englishman did not wait to think of regulations when it was a question of life and death.

AT A MEETING at Plymouth, on Friday, of the Council of the University College of the South-West, it was reported that the Chemical Society had made a grant to Dr. S. Glasstone, lecturer in physical chemistry in the College, in respect of his researches in over-voltage, that the Ministry of Agriculture and Fisheries had made a grant to Professor W. H. Lewis and other members of the department of chemistry in connection with researches into the causes of the pollution of the rivers Exe and Teign, and the Royal Society a grant of £130 to Professor F. H. Newman, head of the department of physics, in regard to his researches touching low voltage arcs in vapours of the alkali metals. Mr. Henry Rowe, B.Sc., was appointed demonstrator in physics in succession to Mr. W. B. Rowe, B.Sc., who has received an appointment from the Royal Society.

C

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Abstracts of Complete Specifications

213,754. GAS FROM COAL, OR FROM COAL AND OIL, MANUFACTURE OF. E. Neath, 61, Aubrey Road, Small Heath, Birmingham. Application date, January 11, 1923.

This apparatus is for manufacturing gas, in which the retorts for carbonising coal open into a generator chamber, and the generator furnace is in one phase subjected to an air blast for heating the retorts, and in another phase supplied with steam to produce water gas, which is added to the coal gas from the retorts. The coal gas is passed into the empty upper part of the generator, and withdrawn from the middle or bottom of the generator, together with the water gas. The mixed gas passes to a single off-take flue, the usual ascension pipes being omitted. The flue is connected by valves to the hydraulic main, or to the exhaust flue. The incandescent coke in the generator is treated with crude oil or tar to enrich the water gas. Oil may also be injected into the mixed gas, which is passed through hot chequer bricks to vaporise it.

213,946. TREATING OILS, METHOD OF. G. E. Heyl, 36, Victoria Street, Westminster, London, S.W.1. Application date, September 7, 1923.

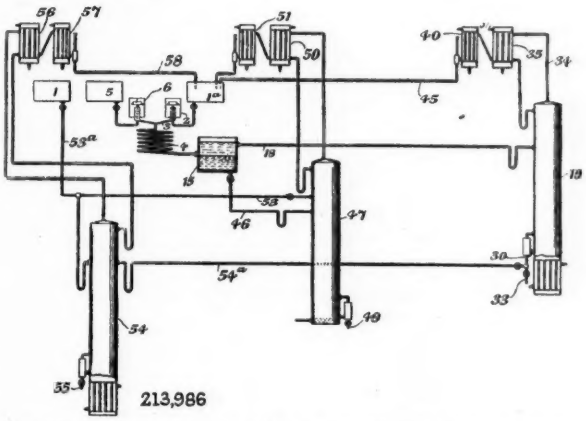
Mineral oil is desulphurised by subjecting it to the action of an electric current when mixed with a suitable solution of an aqueous salt such as sodium chloride or hydrate. It is found that the period of treatment may be decreased by adding a metal or other catalyst such as palladium or nickel, which is precipitated in the pores of coke, and packed between the electrode plates. The oil may be emulsified with brine, or alternatively ground oil shale may be similarly treated. The electrodes may be of lead, and the current may be applied at a voltage of 4 to 25 volts, or a high tension current may be used. The sulphur in the oil is converted into compounds which settle to the bottom. Hydrogen may also be blown through the oil while under the electric treatment to obtain very light oils or gas.

213,984–5–6. ALCOHOLS FREE FROM WATER, APPARATUS FOR OBTAINING. E. C. R. Marks, London. From U.S. Industrial Alcohol Co., 27, William Street, New York. Application date, January 11, 1923.

213,984. To obtain absolute alcohol from a mixture of alcohol and water, *e.g.*, alcohol of 95 per cent. strength, the water-containing alcohol is mixed with a third liquid which is immiscible with alcohol, but miscible with alcohol, such as benzol, carbon tetrachloride, hexane, etc. This mixture is treated in a rectifying column from which absolute alcohol is removed as a residue. The evolved vapours are composed of a ternary mixture of the three constituents. The rectifying column is connected to a condenser, and the latter to a separating chamber and scrubber. The benzol separated from the scrubber is returned to the rectifier, and the rectifier and condenser are connected to a scrubber to recover the alcohol. The apparatus employed is described in detail in connection with Specification No. 206,747 (see THE CHEMICAL AGE, Vol. IX, p. 666).

213,985. This invention is similar in principle to that of Specification No. 213,984, except that the third liquid is ethyl acetate. The mixed liquids are treated in a rectifying column, from which alcohol of high strength is obtained as a residue, and a mixture of the three vapours as a distillate. This distillate has a different percentage composition from that of the liquid mixture, and has a constant boiling point. The constant boiling mixture is treated with a further quantity of water, and is then separated into two immiscible layers containing high and low percentages of ethyl acetate. The liquid layer containing the high percentate of ethyl acetate is rectified to obtain the ethyl acetate as a residue of 100 per cent. strength, part of which is fed to the first rectifier. The distillate is a constant boiling mixture of the three liquids. The layer containing the lower percentage of ethyl acetate is also rectified to obtain a constant boiling mixture of the three liquids, alcohol which is added to the first rectification, and water which remains as a residue. All these constant boiling mixtures are collected and treated with water and separated into two immiscible layers containing high and low percentages of ethyl acetate.

213,986. This specification describes the apparatus for carrying out the process of Specification No. 213,985 above. Ethyl alcohol of 95 per cent. strength is fed to a reservoir 1, and ethyl acetate to a reservoir 1^a at substantially the same rate. During the operation of the apparatus a constant boiling mixture composed of 83 per cent. ethyl acetate, 9 per cent. ethyl alcohol, and 8 per cent. water, flows into the reservoir 1^a from the three pipes shown, and then through a measuring device 2 and pipe 3 to a mixing coil 4. Water is supplied from a tank 5 to the measuring device 6, and mixing coil 4. The measuring devices 2 and 6 operate on the weir principle. The liquid then passes to a separating tank 15, where it separates into two layers, the upper containing 93 per cent. ethyl acetate, 5·5 per cent. water, and 1·5 per cent. alcohol, and the lower containing 8 per cent. ethyl acetate, 86 per cent. water, and 6 per cent. ethyl alcohol. The upper layer is drawn off by a pipe 18 to a column 19, having a series of superposed trays from the liquid overflows to the tray next below. The ascending vapour is caused to pass through the liquid in the trays by means of liquid-sealed bells. Ethyl acetate of 100 per cent. strength is drawn off by the pipe 30. The lower end of the column 19 is maintained at 77° C., and the upper end at 71° C., and a mixture of ethyl acetate, water and alcohol vapour is carried over by the pipe 34 to the dephlegmator 35.



Condensed liquid passes from the dephlegmator back to the column 19, and vapour of ethyl acetate and water passes to a condenser 40. The condensed liquid consisting of 83 per cent. ethyl acetate, 8 per cent. water, and 9 per cent. alcohol, passes by the pipe 45 to the tank 1^a.

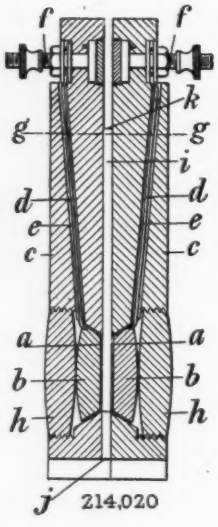
The lower layer of liquid in the tank 15 passes by pipe 46 to a column 47, which is heated by live steam instead of by indirect heat which is employed in column 19. The lower end of the column 47 is maintained at 100° C., and the upper end at 71° C. Water is drawn off at the outlet 49, and the vapour passes to a dephlegmator 50 and condenser 51. From the latter, a constant boiling mixture of the same composition passes to the tank 1^a.

At a point in the column 47 at which the temperature is 78° C., the excess of ethyl alcohol of 95 per cent. strength is drawn off by a pipe 53 to a third column 54, which is also provided with a pipe 54^a to convey ethyl acetate of 100 per cent. strength from the column 19. The pipe 53^a which conveys the constant supply of 95 per cent. alcohol from the tank 1 is connected to the pipe 53. The lower end of the column 54 is maintained at 58° C., and the upper end at 71° C., and absolute alcohol is drawn off at the bottom. This column is provided with a dephlegmator 56 and condenser 57, from which the same constant boiling mixture passes by a pipe 58 to the tank 1^a. The apparatus thus yields a continuous supply of absolute alcohol from the pipe 55, ethyl acetate from the pipe 33, and water from the pipe 49. The apparatus is also applicable for treating other alcohols such as propyl alcohol.

213,991. SYNTHETIC MENTHOL. Howards and Sons, Ltd., Uphall Works, Ilford, Essex, and J. W. Blagden, Appletree House, Grove Road, South Woodford, London, E.18. Application date, January 12, 1923.

When thymol is hydrogenated catalytically, a mixture is produced of a substance which is a crystalline solid at ordinary temperature and is an optically inactive menthol, and a liquid which appears to be an isomer. It is found that if the thymol is mixed with some of the latter liquid before hydrogenation, the crystalline product obtained on hydrogenation bears practically the same proportion to the mass as when thymol alone is hydrogenated. Thus if successive batches of thymol are treated, the whole of it may be converted into solid menthol, except the liquid from the first batch which is added to the succeeding batches. It is also found that if the whole of the hydrogenated product is agitated with the catalyst at a temperature below that of hydrogenation, and in an atmosphere of hydrogen under pressure, a higher proportion of crystalline solid menthol may be obtained than if the original hydrogenated thymol is cooled without further agitation. A further quantity of crystalline solid may be obtained by heating the separated liquid and agitating it under similar conditions. In an example, a mixture of thymol 150 lb. and reduced nickel catalyst 2 lb. is heated and stirred in an autoclave with hydrogen at a temperature of 130°–160° C., and pressure of 30–70 lb. per square inch. The liquid is separated, and cooled to 10° C., and the solid menthol separated. This is replaced by the same weight of fresh thymol and the process repeated. A higher proportion of crystals may be obtained by allowing the hydrogenated mixture in the autoclave to cool to 110° C., and agitating it for several hours in the atmosphere of hydrogen.

214,020. ELECTROLYSERS. Mather and Platt, Ltd., and S. F. Barclay, Park Works, Manchester. Application date, January 31, 1923.



The object is to obtain an improved platinum foil electrode for use in the electrolysis of brine for the production of sodium hypochlorite. The platinum foil electrodes *a* are of saucer shape, and are mounted on vulcanite blocks *b*. Each block is inserted into a recess of similar shape in a vulcanite plate *c* which forms the electrode carrier. Platinum connecting wires *e* pass through holes *d* to the terminals *f*. A rubber compound or similar material is placed in the recess at the back of the electrodes, and is forced into the holes *d* by screwing in plugs *h*. Two adjacent electrode carriers *c* are attached together so as to form a cell as shown with a central space *i* for the circulation of the electrolyte, which enters at *j* and overflows at a weir *k* just above the normal level of the liquid *g*. Highly concentrated sodium hypochlorite may be obtained with this device, without deterioration of the platinum wire connections *e*.

214,112. DYEING OF CELLULOSE ACETATE FIBRES. Morton Sundour Fabrics, Ltd., Carlisle, and W. Kilby, Canal Bank, Port Road, Carlisle. Application date, May 28, 1923.

It is found that some derivatives of anthraquinone which are usually regarded as intermediates are capable of dyeing cellulose acetate fibres in fast shades from an alkaline hydrosulphite vat. Such intermediates are the amido or nitro derivatives of anthraquinone, and simple substituted derivatives containing alkyl or halogen substituents. Suitable intermediates are 1-amido-anthraquinone, 2-amido-anthraquinone, 1 : 5-dinitroanthraquinone, 1 : 5-diamido-anthraquinone, 1 : 4-diamidoanthraquinone, 1-methylamido-anthraquinone, 1-amido-2-methylanthraquinone, 1-amido-2 : 4-dibromanthraquinone, 1-amido-5-chloranthraquinone, 1-nitro-4-chloranthraquinone. These intermediates yield yellow, orange, red, or violet shades. The dyed material may be treated with nitrous acid and the free amino group diazotised. Developers such as β-naphthol may then be used, to obtain a greater variety of shades.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention :—206,488 (Soc. Anon. des Matières Colorantes et Produits Chimiques de Saint Denis, A. Wahl, and R. Lantz) relating to the manufacture of dyestuffs of the azine group, see Vol. X., p. 45 ; 207,488 (Koppers Co.) relating to a process and apparatus for purifying gases, see Vol. X., p. 122 ; 210,399 (Soc. Chimique de la Grande Paroisse (Azote et Produits Chimiques) relating to the manufacture of fertilisers, see Vol. X., p. 334.

International Specifications not yet Accepted

212,569. ARYL-OXYNAPHTHYL-KETONES. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, March 6, 1923. Addition to 203,824. (See THE CHEMICAL AGE, Vol. IX., p. 431.)

One molecular proportion of α-naphthol is treated with at least one molecular proportion of an aryl trichloride in the presence of a diluent such as sulphuric acid or nitro-benzene, and a condensing agent having an acid action such as a metal, metal salt or oxide, or a non-metal such as phosphorus, or its oxide, oxyhalide, or halide. 4-oxynaphthalene-1-arylketones are obtained. In an example, benzotrichloride is condensed with α-naphthol, in the presence of sulphuric acid, or nitrobenzene and zinc oxide, to obtain 4-oxynaphthalene-1-phenylketone, which is isolated by boiling with sodium carbonate, filtering and acidifying. Chlor-benzo- and chlor-naphthotrichlorides may also be used.

212,864-5. CELLULOSE SOLUTIONS, ARTIFICIAL SILK, ETC. L. Lilienfeld, 1, Zeltgasse, Vienna. International Convention date, March 15, 1923.

212,864. A cellulose material is converted into a solution or a plastic or gelatinous mixture by treating with aqueous alkali at 0° C. to -25° C. This process is applicable to various kinds of cellulose materials, viz., bleached or unbleached cellulose, conversion products obtained by treating with water, glycerine, oxidizing or reducing agents, or hot or cold alkali lyes ; cellulose products obtained from ammoniacal copper, or zinc chloride solutions, or sulphuric, phosphoric, or hydrochloric acid solutions, or raw or purified viscose solution ; conversion products obtained by treating cellulose, hydrocelluloses, cellulose hydrates, etc., with solvents, but not to the point of solution ; hydrocelluloses ; denitrated cellulose nitrate, saponified cellulose acetate, formate, etc. ; oxycelluloses ; and partly alkylated products. The low temperature enables solutions to be obtained in alkali without degradation of the cellulose molecule, and such degradation if started by previous treatment may be neutralised by subsequent solution at low temperature. The strength of the alkali solution employed is preferably 4-10 per cent., and the temperature employed depends on the strength of the alkali and on the nature of the cellulose. As an example, mercerised sulphite cellulose that has been pressed, comminuted, washed, and treated with dilute acid is dissolved in 4 per cent. soda lye at —9° to —11° C., or in 8 per cent. lye at —8° to —9° C. Further cooling may be necessary after complete solution. The solutions may be used for the manufacture of artificial silk, etc., and some are very durable, while others give reversible or irreversible jellies.

212,865. Viscose solutions are made while the materials are at a temperature of —3° to —15° C. The cooling may be employed before, during, or after treating the cellulose with carbon disulphide, but it is necessary that the action of the disulphide proceeds wholly or in part before solution takes place, *i.e.*, before cooling begins. The process may be a single operation, which may include the mixing of the cellulose with the alkali. Partial or complete separation of crystals may take place. The duration of the process is minimised, and the usual "ripening" may be dispensed with. The amount of carbon disulphide used may be reduced to $\frac{1}{8}$-$\frac{1}{5}$ of a molecule to the molecule of cellulose. The starting material may be the various cellulosic products mentioned in 212,864 above, and this may be converted into alkali cellulose by treating with 15-50 per cent. lye, the excess being removed by pressing. Alternatively, a limited quantity of lye may be

used, and the pressing omitted. In another alternative, dilute lye of 3-12 per cent. strength may be used. The sulphidizing operation may be conducted at a temperature up to 3° C., and the dissolution at lower temperatures of 0° to —25° C. The temperature employed depends on the strength of the alkali, the proportion of carbon disulphide, and the chemical and physical properties of the cellulose. More dilute lye involves lower temperatures, and smaller proportions of carbon disulphide also involve lower temperatures. The less the degradation of the cellulose, the lower the temperature necessary.

212,914. Colloidal Silver and Mercury Solutions. Agoleum Ges., 20, V. Krongasse, Vienna. International Convention date, March 14, 1923.

Silver oxide, hydroxide, carbonate or other compound capable of forming a soap with oil is added to the oil, fat, or fatty acid at 200°-300° C., the solution filtered, and hydrogen passed through. The silver soap acts as a protective colloid. An oil-soluble reducing agent such as hydroquinone may be added before hydrogen is passed through. The solutions may be heated with mercury or mercuric oxide to obtain colloidal solutions of silver and mercury. Examples are given.

212,936. Dyes. Compagnie Nationale de Matières Colorantes et de Produits Chimiques, 134, Boulevard Haussmann, Paris. International Convention date, March 16, 1923.

The condensation products made by the action of an anhydrous metal chloride, such as aluminium or ferric chloride, on a hydroxylated derivative, preferably one containing one or more naphthalene nuclei, are heated with alkali polysulphide to obtain dyestuffs which dye cotton black from a hydrosulphite vat. In examples, β-naphthol and 2 : 7-dioxynaphthalene are respectively heated with aluminium chloride at 220° C., and the product extracted with acid and alkali, and heated with sulphur and sodium sulphide to 305°-310° C. β-dinaphthol may be similarly treated with aluminium chloride until 1 : 12-dioxyperylene and 1 : 12-perylene-quinone are absent, and the product extracted with acid and treated with polysulphide.

Latest Notifications.

215,316. Process for the production of solutions of mercury derivatives of hydroxy-benzene-sulphonic acids and their homologues, suitable for use in therapeutics. Chemosan Akt.-Ges. April 30, 1923.

215,328. Manufacture of mouldings of solid soluble alkali silicates. Henkel et Cie. Ges. May 2, 1923.

215,336. Process of converting hydrocarbons and mineral oils having a high boiling-point into those having a lower boiling-point. Wolf, H. May 1, 1923.

215,357. Manufacture of Portland cement. Pioda, L. E. W. May 4, 1923.

215,373. Process for dyeing acetate silk. Farbenfabriken vorm. F. Bayer and Co. May 1, 1923.

215,374. Process of making methane. Farbwerke vorm. Meister, Lucius, and Brüning. May 1, 1923.

215,379. Manufacture of disazo dyestuffs. Durand and Huguenin Akt.-Ges. May 2, 1923.

Specifications Accepted, with Date of Application

198,328, 206,862. Activated carbon, Process of producing—and apparatus therefor. Algemeene Norit Maatschappij. May 26, 1922.

200,508. Organic super-oxides in a finely divided condition, Method for obtaining. Naamlooze Vennootschap Vereenigde Fabrieken van Chemische Producten. July 4, 1922.

206,809. Titaniferous material, Treatment of. Titanium Pigment Co., Inc. November 8, 1922.

207,489. Oxalic acid or its salts, Processes for obtaining. Bhopal Produce Trust, Ltd., and W. A. Fraymouth. November 25, 1922.

208,503. Distilling water, Apparatus for. Appareils et Evaporateurs Kestner. December 16, 1922.

211,832. Rendering porous electrodes impermeable to liquids, Process for. Soc. Anon. Le Carbone. February 21, 1923.

214,675. Dry distillation, de-gasification or gasification of solid fuels and the like. O. Hellmann. December 13, 1922.

214,733. Purifying mineral oils from sulphur, Process for. Anglo-Saxon Petroleum Co., Ltd. (*E. S. Hillman.*) January 27, 1923.

214,735. Solvent soaps from sulphonated oils, Manufacture of. M. I. Aische. January 29, 1923.

214,756. Acridines, Manufacture of bodies related to. British Dyestuffs Corporation, Ltd., W. H. Perkin, and G. R. Clemo. February 6, 1923.

214,765. Anthraquinione bodies, Production of. H. A. E. Drescher, J. Thomas, and Scottish Dyes, Ltd. February 8, 1923.

214,836. *p*-dialkylamino-arylphosphinous acids, Manufacture of. R. B. Ranford. (*L. Casella & Co., Ges.*) May 3, 1923.

214,864. Indigoid dyestuffs and intermediate products, Manufacture of. O. Y. Imray. (*Soc. of Chemical Industry in Basle.*) June 8, 1923.

214,866. Benzene derivatives containing carbon side-chains, particularly thymol, Manufacture of. Howards & Sons, Ltd., and J. W. Blagden. June 12, 1923.

214,871. Oils and spirits, Treatment and purification of. V.L. Oil Processes, Ltd., and O. D. Lucas. June 21, 1923.

214,699. China clays, Process for the removal of the brown coloration in. L. A. Holden. January 19, 1923.

Applications for Patents

Ackermann, F., Society of Chemical Industry in Basle, and Steinbuch, E. Condensation products of the anthraquinone series. 11,219. May 6.

Algemeene Norit Maatschappij and Potts, H. E. Production of active carbons. 11,451. May 9.

Anderson, J., British Alizarine Co., Ltd., and Dawson, W. H. Manufacture of dyestuffs and intermediates. 11,137. May 6.

Barratt, J., and Greaves, W. H. Apparatus for distilling ammonia liquor, washing gases, etc. 11,135. May 6.

Bonhôte, G., Society of Chemical Industry in Basle, and Montmollin, G. de. Manufacture of aryloxynaphthylketones. 11,326. May 7.

Candles, Ltd., and Griffin, J. P. D. Manufacture of candles. 11,069. May 5.

Chemische Fabrik Griesheim-Elektron and Mond, A. Turbo-mixer. 11,414. May 8.

Chemische Fabrik Griesheim-Elektron and Mond, A. Utilisation of nutrient-containing shells. 11,415. May 8.

Craig, R., and Lever Bros., Ltd. Distillation, etc., plants. 11,530 11,531. May 9.

Evans, R. L. Dyes. 11,113. May 5.

Farbenfabriken vorm. F. Bayer and Co. Manufacture of azo dyestuffs. 11,322. May 7. (Germany, May 7, 1923.)

Farbenfabriken vorm. F. Bayer and Co. Process for dyeing acetate silk. 11,545. May 9. (Germany, May 9, 1923.)

Farbwerke vorm. Meister, Lucius, and Brüning. Manufacture of dyestuffs. 11,540. May 9. (Germany, May 9, 1923.)

Goldschmidt Akt.-Ges., T. Production of sulphur. 11,032. May 5. (Germany, August 16, 1923.)

Imray, O. Y., and Society of Chemical Industry in Basle. Manufacture of dyestuffs, etc. 11,439, 11,440. May 8.

Koppers Coke Oven Co., Ltd. Vertical retorts for distilling fuel. 11,187. May 6. (Germany, May 7, 1923.)

Lockemann, G. Manufacture of 1-phenyl-2. 3-dimethyl-4-dimethylamino-5-pyrazolone. 11,614. May 10. (Germany, October 11, 1923.)

Mackley, E. N. Centrifugal pumps. 11,538. May 9.

Manlove, Alliott and Co., Ltd. Extracting oil from palm fruit. 11,159. May 6.

Minerals Separation, Ltd. Concentration of ores. 11,215. May 6. (United States, October 23, 1923.)

Neill, O. S. Heat process of manufacturing ferric oxide. 11,036. May 5. (Australia, March 12.)

Newby, C. F. J. Cellulose-acetate varnishes. 11,324, 11,325. May 7.

Sauer, J. N. A. Production and revivification of activated carbon. 11,453. May 9.

Smith, S. C. Conversion of lead sulphate into lead carbonate. 11,109. May 5.

Conversion of Clay to Aluminium Sulphate

For some months past investigators of the Interior Department attached to the Berkeley, California, experiment station of the American Bureau of Mines have studied the problem of the conversion of clay to aluminum sulphate. A special study of the dissolutions of clays in various strengths of sulphuric acid and at various temperatures has been made. Different clays show quite large individual differences in their reaction with acid. The different types of material so far tested include: California fire-clays, an Idaho kaolin, a Georgia kaolin, a Missouri diaspore, a California bentonite, a Dakota bentonite, and a Utah alunite. A fullers earth from Florida was also tested, but was too low in alumina to be considered. During the present fiscal year liquid sulphur dioxide and water in sufficient proportion to make a strong sulphurous acid will be tested under pressure and heat for decomposing clays, as it promises to be much easier to purify the solutions and recover aluminium oxide from the aluminium sulphite solution than is possible with sulphuric acid and aluminium sulphate solutions.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to* THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.

London, May 15, 1924.

TRADE generally has been fair during the week and a better inquiry has been experienced; values on the whole are firm.

The export demand has not been quite so active, but quite a fair volume of inquiry is in evidence.

General Chemicals

ACETONE has been in better request and the price is inclined to become firmer.

ACID ACETIC.—There is little change to report and the value continues firm with a fair amount of business.

ACID CITRIC is in extremely small demand considering the time of the year.

ACID FORMIC continues extremely scarce on the spot and the price is unchanged.

ACID LACTIC meets with a moderate demand.

ACID OXALIC is still rather a poor market although the price is maintained.

BARIUM CHLORIDE continues firm with a good business passing.

BLEACHING POWDER is unchanged.

COPPER SULPHATE.—A very fair business has been transacted and Continental material now approximates in price to that of the British makers.

CALCIUM CARBIDE has been advanced £1 per ton by the makers.

CREAM OF TARTAR is firm and inclined to be scarce.

FORMALDEHYDE seems to be a shade easier, but business is quite active.

LEAD ACETATE is in good request and price well maintained.

METHYL ALCOHOL is dull and price in buyers' favour.

POTASSIUM CARBONATE AND CAUSTIC are unchanged.

POTASSIUM PERMANGANATE is lifeless and price easy.

POTASSIUM PRUSSIATE.—Only a small business is reported at unchanged values.

SALTCAKE.—British makers have reduced their price for export and this will probably encourage business.

SODIUM ACETATE continues scarce and a good business is offering for forward delivery.

SODIUM BICHROMATE is in good request at British makers' figures.

SODIUM HYPOSULPHITE has been in demand, especially for the photographic quality; price well maintained.

SODIUM NITRITE is quite active and scarce for early delivery.

SODIUM PHOSPHATE is well inquired for and price unchanged.

SODIUM PRUSSIATE continues idle and price easy.

SODIUM SULPHIDE is active, especially for export.

Coal Tar Intermediates

Business in this market during the last week continues to be of fair interest and a steady export inquiry. Prices on the whole remain unchanged.

ALPHA NAPHTHOL is without change in value.

ALPHA NAPTHYLAMINE is steady at recent quoted prices.

ANILINE OIL has been quieter of late.

ANILINE SALT has been inquired for on export account.

BENZIDINE BASE.—A fair home trade business is passing.

DIMETHYLANILINE is in moderate request.

"H" ACID maintains a steady business.

NITRO BENZOL continues in fair request and the price is firm.

PARANITRANILINE is without special feature.

RESORCINE is of interest on export account and supplies continue somewhat short.

XYLIDINE is without special interest.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID.—A steady trade is reported at last prices.

BISMUTH SALTS are firm.

BROMIDES.—Unchanged—cheap offers of potassium and sodium continue to be made.

HEXAMINE.—The undertone is firm.

METHYL SALICYLATE is in buyers' favour.

MILK SUGAR.—Makers are sold well ahead and show no inclination to reduce prices. At this period of the year, when milk is usually more plentiful, an easier tendency is often in evidence, but the contrary would seem to be the case so far during the present season.

MORPHIA SALTS.—The makers have announced a further reduction in sympathy with the price of opium.

PHENAZONE is slightly easier.

PHENOLPHTHALEIN.—The price has been cut by dealers.

SODA SALICYLATE has been in good demand. Prices are steady but unchanged.

Coal Tar Products

There is no great change in the market for coal tar products since last week.

90 PER CENT BENZOL is steady at 1s. 6d. to 1s. 7d. per gallon on rails.

PURE BENZOL is quietly steady at 1s. 11d. per gallon on rails.

CREOSOTE OIL is quoted at 7d. to 7¼d. per gallon on rails in the North, while the price in London is in the region of 8½d. per gallon.

CRESYLIC ACID is quoted at 1s. 11d. per gallon on rails for the pale quality 97/99 per cent., while the dark quality 95/97 per cent. is worth 1s. 9d. per gallon.

SOLVENT NAPHTHA is unchanged at 1s. 3d. per gallon on rails.

HEAVY NAPHTHA is also unchanged at 1s. 2d. to 1s. 3d. per gallon on rails.

NAPHTHALENES are uninteresting, the lower qualities being worth from £6 to £6 10s. per ton, and 76/78 melting point £8 10s. to £9 per ton.

PITCH.—Little business is being transacted but previous values are maintained.

Sulphate of Ammonia

The demand remains satisfactory.

Current Market Prices

OWING to pressure on our space the current market prices are unavoidably omitted this week.

Essential Oils and Synthetics

ESSENTIAL OILS.	£	s.	d.
Anise ..... easier, c.i.f. 2/5 spot	0	2	6
Bay	0	10	6
Bergamot	0	18	0
Cajuput	0	3	3
Camphor, white ..... per cwt.	3	10	0
Brown ..... "	3	10	0
Cassia ..... c.i.f. 7/3, spot	0	8	0
Cedarwood	0	1	9
Citronella (Ceylon) ..... dearer, c.i.f. 3/5, spot	0	3	7
(Java) ..... dearer, c.i.f. 5/-, spot	0	5	2
Clove ..... easier	0	7	6
Eucalyptes	0	2	1
Geranium Bourbon ..... dearer	1	15	0
Lavender ..... dearer	1	10	0
Lavender Spike ..... easier	0	5	6
Lemon	0	3	6
Lemongrass ..... per oz.	0	0	2½
Lime (distilled)	0	5	0
Orange sweet (Sicilian)	0	13	0
(West Indian)	0	10	0
Palmarosa	0	18	0
Peppermint (American)	1	1	0
Mint (dementholised Japanese) ..... easier	0	16	6
Patchouli	1	2	6
Otto of Rose ..... per oz.	1	15	0
Rosemary	0	1	9
Sandalwood	1	5	0
Sassafras ..... easier	0	9	6
Thyme ..... 4/6 to	0	5	6

There are no changes to record in the prices of Synthetics this week.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, May 15, 1924.

THE improvement in business recorded last week has not been very well maintained, only a moderate number of inquiries being received, and in most cases for small quantities.

Numerous Continental offers continue to be received, and the tendency is for prices to be higher.

Home manufactured products are on about the same level as last reported.

Industrial Chemicals

ACID ACETIC.—Prices remain unchanged. Glacial, 98/100% now quoted £61 to £69 per ton; 80% pure, £49 to £51 per ton; 80% technical, £46 to £48 per ton, all packed in casks, delivered c.i.f., U.K. port, duty free.

ACID BORACIC.—Crystals or granulated, £48 per ton; powdered, £50 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Rather better inquiry. Now quoted 8d. to 8¼d. per lb., carriage paid, or f.o.b. U.K. port.

ACID CITRIC, B.P. CRYSTALS.—Rather better inquiry. Spot material now quoted 1s. 6¼d. per lb., less 5%, ex store. Offered for early delivery at 1s. 5¾d. per lb., less 5% ex wharf.

ACID FORMIC, 85%.—Spot material on offer at £63 per ton, ex store. Offered for early delivery at about £61 10s. per ton, c.i.f. U.K. port.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Price unchanged at about 5¼d. per lb., ex store, spot delivery. Offered for early delivery from the Continent at about 4½d. per lb., c.i.f. U.K. port.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—In little demand. Spot lots quoted 1s. 1¾d. per lb., less 5%, ex store. Offered for early delivery at 1s. 1d. per lb., less 5%, c.i.f. U.K. port.

ALUMINA SULPHATE, 17/18%, IRON FREE.—Spot lots quoted £8 per ton, ex store. Offered for early delivery at about £7 5s. per ton, c.i.f. U.K. port.

ALUM CHROME.—Ammonium chrome alum quoted £19 to £21 per ton according to quality, f.o.b. U.K. port. Potash chrome alum about £26 per ton, ex store or station.

ALUM POTASH (LUMP).—In little demand. Spot material now available at about £10 15s. per ton, ex store. Offered from the Continent at about £9 5s. per ton, c.i.f. U.K. port. Crystal quality 10s. per ton less.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 5½d. per lb., ex station, prompt delivery.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks, delivered U.K.

AMMONIA LIQUID, 880°.—Unchanged at 2½d. to 3d. per lb., delivered, according to quantity. Containers extra.

AMMONIA MURIATE.—Grey galvanisers quality on offer at £30 per ton, ex station, or delivered, f.o.b. U.K. port. Good inquiry for export. Fine white crystals offered from the Continent at about £26 per ton, c.i.f. U.K. port.

AMMONIA SULPHATE.—25¼%, £13 12s. per ton; 25¾%, neutral quality, £14 15s. per ton, ex works, prompt delivery.

ARSENIC, WHITE POWDERED.—Moderate demand. Spot lots on offer at about £59 to £60 per ton, ex store. Offered for export at about £56 per ton, f.o.b. U.K. port.

BARIUM CHLORIDE, 98/100%.—English material quoted £14 to £14 5s. per ton, ex store. Offered from the Continent at about £13 7s. 6d. per ton, c.i.f. U.K. port.

BARYTES.—Finest English white quoted £5 5s. per ton, ex works. Continental about £5 per ton, c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots £11 per ton, ex station. Contracts 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystal, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station. Continental about £4 17s. 6d. per ton, c.i.f. U.K. port.

COPPERAS, GREEN.—Unchanged at about £2 5s. per ton, f.o.b. U.K. port in bulk. Quoted £3 5s. to £3 10s. per ton, in casks.

COPPER SULPHATE.—Moderate inquiry for export. Quoted £25 12s. 6d. per ton less 5%, f.o.b. U.K. port. Continental manufactured material on offer at about £25 per ton, ex store.

FORMALDEHYDE, 40%.—Moderate inquiry and price unchanged at about £63 per ton, ex store, spot delivery.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental on offer at about £3 5s. per ton, c.i.f. U.K. port.

LEAD, RED.—Cheaper offers of Continental material. Now quoted £37 10s. to £38 per ton, ex wharf, early delivery.

LEAD, WHITE.—Spot material on offer at about £42 per ton, ex store.

LEAD ACETATE.—White crystals offered at £48 per ton, ex store; brown about 20s. per ton less; brown crystals offered from the Continent at about £45 5s. per ton, c.i.f. U.K. port.

MAGNESITE CALCINED.—English ground material offered at £8 per ton, ex station. Moderate inquiry for export.

MAGNESIUM CHLORIDE.—Continental offers inclined to be higher. Now quoted £3 10s. per ton, c.i.f. U.K. port. Spot lots on offer at about £4 2s. 6d. per ton, ex wharf.

MAGNESIUM SULPHATE (EPSOM SALTS).—English material, commercial quality, on offer at about £5 per ton, ex store. B.P. quality quoted £6 5s. per ton, ex station. Commercial quality offered from the Continent at about £3 12s. 6d. per ton, c.i.f. U.K. port.

POTASH CAUSTIC, 88/92%.—Moderate inquiry. Spot lots quoted £31 10s. to £32 per ton, ex store. Offered from the Continent at about £30 per ton, ex wharf.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE, 96/98%—Offered from the Continent at about £25 per ton, c.i.f. U.K. port. Spot lots on offer at about £26 15s. per ton, ex store.

POTASSIUM CHLORATE.—Spot lots available at 3¼d. per lb., ex store, in little demand.

POTASSIUM NITRATE (SALTPETRE).—Quoted £27 10s. per ton, c.i.f. U.K. port, prompt shipment. Spot lots unchanged at about £30 10s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Spot lots available at about 8¾d. per lb., ex store. Offered for early delivery at 8¼d. to 8½d. per lb., ex station.

POTASSIUM PRUSSIATE (YELLOW).—Rather better inquiry. Spot material quoted 8¼d. per lb., ex station or f.o.b. U.K. port. Continental on offer at about 8¼d. per lb., c.i.f. U.K. port.

SODA CAUSTIC.—76/77% £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62% broken, £19 2s. 6d. per ton; 98/99% powdered, £22 15s. per ton. All ex station spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Spot material quoted £25 10s. to £26 per ton, ex store. Offered from the Continent at about £23 17s. 6d. per ton, c.i.f. U.K. port.

SODIUM BICARBONATE.—Refined recrystallised quality £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—English makers' prices unchanged at 4½d. per lb. D/d.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station. Alkali, 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material quoted £10 per ton, ex station. Continental on offer at slightly less. Pea crystals of English manufacture quoted £14 per ton, ex station.

SODIUM NITRATE.—96/98% quality unchaned at £13 10s. to £13 15s. per ton, f.o.r. or f.o.b. U.K. pogrt.

SODIUM NITRITE, 100%.—Moderate inquiry. Price about £28 per ton, f.o.b. U.K. port.

SODIUM PRUSSIATE (YELLOW).—English material quoted 4¾d. per lb., f.o.b.U.K. port. Continental offered at 4½ per lb., c.i.f. U.K. port.

SODIUM SULPHATE (SALTCAKE).—Price for home consumption £3 10s. per ton, carriage paid buyers' stations. Quoted 65s. per ton, f.o.b. U.K. port for export.

SODIUM SULPHIDE.—60/65% solid, English make, £14 15s. per ton, ex station; broken, £1 per ton more; flake £2 per ton more. 60/62% solid offered from the Continent at £12 10s. per ton, c.i.f. U.K. port; broken, £1 per ton more. 31/34% crystals, English make, £9 2s. 6d. per ton, ex station; 30/32%, crystals, Continental make, £8 12s. 6d. per ton, c.i.f. U.K. port.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.

ZINC CHLORIDE, 98/100%.—Quoted £26 10s. per ton, f.o.b. U.K. port.

ZINC SULPHATE.—English material about £13 10s. per ton, ex store. Offered from the Continent at £11 7s. 6d. per ton, c.i.f. U.K. port.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ACETANILIDE.—Home inquiry. Price 1s. 7d. lb., delivered.

ANILINE OIL.—Moderate export inquiry. Price 9d. lb., drums included, f.o.b.

AMIDO G ACID.—Export inquiry. Price 4s. 4d. lb., f.o.b.

AMIDO R ACID.—Price 5s. 9d. per lb., f.o.b.

DINITROBENZOL.—Small export inquiry. Price 10d. per lb., f.o.b.

DINITROTOLUOL.—Export inquiry. Price 11d. lb., f.o.b.

GAMMA ACID.—Export inquiry. Price 11s. lb., 100% basis, f.o.b.

H ACID.—Export inquiry. Price 4s. 4d. lb., 100% basis, f.o.b.

DIMETHYLANILINE.—Several export inquiries. Price 2s. 4½d. lb., f.o.b., drums included.

META XYLIDINE.—Export inquiry. Price 5s. 6d. lb. f.o.b., drums included.

N.W. ACID.—Small home inquiry. Price 5s. 11d. lb., 100% basis, carriage paid.

ORTHO TOLUIDINE.—Some export inquiry. Price 7½d. lb., drums included, f.o.b.

PARANITRANILINE.—Good export inquiry. Price 2s. 4d. lb. f.o.b.

PARA PHENYLENEDIAMINE.—Small export inquiry. Price 10s. 6d. lb., 100% basis, f.o.b.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

MARKET FOR PAINTS, ETC.—A confidential report on the market for paints, etc., in Bolivia has been prepared by the Department of Overseas Trade. British firms desirous of receiving a copy of this report should communicate with the Department.—Reference number D.O.T.884/22/F.G./C.C./2.

INDUSTRIAL CHEMICALS FOR DENMARK.—A commission agent in Copenhagen desires to secure the representation for Denmark of British manufacturers of red lead, industrial chemicals and anti-rust paint.—Reference No. 541.

AMMONIA.—A Turkish firm of merchants in Constantinople desires to get into touch with British exporters of ammonia, zinc and tinplates.

TENDERS INVITED FOR PAINT.—The Director-General, India Store Department, Branch No. 10, Belvedere Road, Lambeth, London, requires red lead paint, dry and white lead paint, ground in oil. Tender forms are obtainable on application to the Director-General at the above address.

VARNISH GUMS.—A commission agent of Barcelona is desirous of securing the representation of a British exporter of varnish gums.—Reference No. 557.

The Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, May 15, 1924.

PRICES have been steadier during the past week and only one or two minor concessions have to be reported. Business is still rather quiet although in some quarters a slight improvement is spoken of. Any movement of importance, however, is restricted to a few of the principal heavy chemicals, trade in other lines being on a small, hand-to-mouth scale. This applies pretty well to the export as well as the home trade.

Heavy Chemicals

Saltcake remains inactive at the revised prices of £3 10s. per ton delivered to home users and £3 f.o.b. for shipment. Prussiate of soda is still a very slow section of the market and values are weak at 4½d. to 4¾d. per lb. Chlorate of soda attracts a moderate amount of attention at 2¾d. per lb. Sulphide of sodium moves very slowly but values are unchanged from last report at £14 10s. to £14 15s. for 60-65 per cent. concentrated solid and £9 10s. per ton for crystals. Nitrite of soda is still quiet but as supplies are on the short side the price is maintained at round £28 per ton. Bleaching powder is only moderately active at £10 per ton. Glauber salts are steadier though only in small demand at £3 10s. per ton. Caustic soda is firm at £16 17s. 6d. per ton for 60 per cent. and £19 7s. 6d. for 76-77 per cent.; the demand for this material, both from home users and for export, is fairly good. Alkali is also in rather good request for both branches of trade; for home consumption purposes values are steady at £6 15s. per ton for 58 per cent. quality. Hyposulphite of soda is still offering at £14 15s. per ton for photographic crystals and £9 15s. for commercial, without, however, arousing much buying interest. Bichromate of soda is in quietly steady demand at 4½d. per lb. Phosphate of soda is inactive but without change from last week at round £13 10s. per ton. Bicarbonate of soda is steady but only in moderate inquiry at £10 10s. per ton. Soda crystals are in fair request at £5 5s. per ton. Acetate of soda is rather quiet although values are maintained at £23 10s. to £24 per ton.

Both caustic potash and carbonate of potash are steady and meet with a fairly active demand. Caustic potash is offering at from £29 to £30 per ton for 80 per cent. material, and carbonate at £24 10s. to £25. Chlorate of soda is quiet but unchanged at 2¾d. to 3d. per lb. Yellow prussiate of potash is weak and inactive at 8¼d. per lb. Permanganate of potash still fails to attract much attention; offers vary from 7d. to 8d. per lb. according to quality. Bichromate of potash is steady and in fair inquiry at 5¾d. per lb.

Business passing in arsenic continues to be of small dimensions, although values have not given way much since last report; current quotations for white powdered, Cornish makes, are round £60 per ton in Manchester. Sulphate of copper is now quoted at £24 10s. to £25 per ton, f.o.b., and the demand for shipment is said to be a shade more active. Commercial Epsom salts are quiet but steady at £4 10s. per ton, with magnesium sulphate, B.P., on offer at £6 10s. Little change in the position of the acetates has occurred. The demand for acetate of lime is rather small but values are held at £19 per ton for grey and £14 10s. to £15 for brown. Acetate of lime is quiet but steady at £49 and £47 per ton respectively for white and brown qualities. Nitrate of lead is maintained at £45 per ton.

Acids and Tar Products

Citric acid is steady and in moderate inquiry at 1s. 5½d. to 1s. 6d. per lb. Tartaric acid is rather quiet at 1s. 1½d. per lb. Oxalic acid continues dull though values are maintained at last week's level of 5d. to 5¼d. per lb. Acetic acid is firm and in rather good demand at £48 per ton for 80 per cent. technical and £70 for glacial.

Coal-tar products generally keep quiet. Carbolic acid is weak at 7¾d. per lb. for crystal and round 2s. per gallon for crude. Pitch is stated to have recovered some firmness, although business is still small; to-day's value here is £3 to £3 2s. 6d. per ton. Creosote oil is quiet at 7¾d. per gallon. Solvent naphtha is steady at 1s. 5½d. to 1s. 6d. per gallon. Naphthalenes are about unchanged at £16 per ton for refined, with crude offering at about £6 10s. to £10.

Company News

LONDON NITRATE CO.—The directors have declared an interim dividend of 1s. 6d. per share (7½ per cent.), free of tax, against 5 per cent. a year ago.

ANTON JURGEN'S UNITED(MARGARINE) WORKS.—A dividend for the year ended December 31 is announced at the rate of 6 per cent. per annum on the 6 per cent. cumulative par. "B" preference shares, payable on May 12.

ROSARIO NITRATE CO.—A final dividend is announced at the rate of 6 per cent., less tax, in respect of the year 1923, making a total distribution for the year of 11 per cent., against 10 per cent. for the preceding accounting period of 15 months.

BRITISH COTTON AND WOOL DYERS' ASSOCIATION.—The net profit for the year ended March 31, after allowing for repairs and renewals, depreciation, etc., amounted to £150,234 against £176,548 in the preceding year. The dividend on the ordinary shares is 10 per cent.

EASTMAN KODAK OF NEW JERSEY.—The following dividends have been declared :—Regular dividend of 1¾ per cent. on the preferred stock, regular dividend of $1.25 per share on the common stock, and an extra dividend of $0.75 per share on the common stock, all payable on July 1.

VIEILLE-MONTAGNE CO.—It is reported that the business of this Belgian chemical company increased considerably during the year 1923, with the result that the 1922 net profit of 15·8 million francs is increased to 24·2 millions for the year ended December 31, 1923. The profit on output of ores and zinc rose from 21 millions to 30·4 millions.

AGUAS BLANCAS NITRATE CO.—The net profit for the year 1923 amounted to £21,330, which with £27,141 brought forward makes a total surplus of £48,471 to be dealt with. The interim dividend absorbed £12,973, and it is proposed to pay a final dividend of 50 per cent., making 75 per cent., less tax for the year, leaving a balance of £8,753 to be carried forward.

DORMAN, LONG AND CO., LTD.—The directors recommend a dividend on the preference shares at the rate of 6 per cent. per annum, less tax, for the half-year ending June 30 to shareholders registered on June 16, payable on June 30; also a dividend on the preferred ordinary shares at the rate of 8 per cent. per annum, less tax, for the half-year to March 31 to shareholders registered June 9, payable June 30.

BRUNNER, MOND AND CO., LTD.—The report of the directors for the year ended March 31 last shows a balance to the credit of profit and loss account of £1,552,574, which, with the amount of £88,911 brought forward, makes a total of £1,641,485. The sum of £88,015 is placed to general reserve account, £150,000 to suspense account, and £86,482 is carried forward. The annual meeting will be held at the Midland Adelphi Hotel, Lime Street, Liverpool, on May 23, at 1 p.m.

SOCIETY OF CHEMICAL INDUSTRY, BASLE.—The balance-sheet just issued by the society discloses a net profit of £128,000, as against £100,000 last year. A dividend of 15 per cent., as against 12 per cent., is to be paid. The report states that the past year was a difficult one for the company owing to the import restrictions and tariffs in the various consuming countries. There was, nevertheless, an increased turnover as compared with the previous year, largely due to greater sales in the Far Eastern markets. The subsidiary companies established abroad have extended their output of dyestuffs, but it is hoped to make up for any falling off in the production of the Basle works by the manufacture there of new products of high value. The American branch in Cincinnati has not yet fulfilled expectations, and it is not proving easy to meet the competition of existing American dyestuff manufacturers.

Laboratory Research on Liquid Oxygen Explosives

LABORATORY research work on liquid oxygen explosives being conducted by the Interior Department at the Pittsburgh experiment station of the U.S.A. Bureau of Mines deals with the determination of the physical and chemical properties of dopes and wrappers best adapted for making liquid oxygen explosives with the highest retentivity consistent with adequate explosive properties. Chemical and physical tests have been made on a series of dopes consisting of carbon blacks, gas blacks, and other carbonaceous materials. Their retentivity and explosive properties are being determined.

New Chemical Trade Marks

Applications for Registration

[This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, 51 and 52, Chancery Lane, W.C.2, from whom further information may be obtained.

Opposition to the registration of the following trade marks can be lodged up to June 14, 1924.

444,193. For fertilisers. Fred Chester's Fertiliser Co., Limited, 13, Hamilton Square, Birkenhead, Cheshire, fertiliser manufacturers. January 7, 1924. Registration of this Trade Mark shall give no right to the exclusive use of the numeral "7" or of the words "THE BIG SEVEN."

"MERTONIA."

446,226. For chemical substances used in manufactures, photography or philosophical research, and anti-corrosives. Agnes Harland-Peck, trading as William Harland and Son, Phipps Bridge, Merton, London, S.W.19, varnish, enamel and colour manufacturer. March 12, 1924. (To be Associated. Sect. 24.)

"PETROSIST."

446,522. For paints, enamels, varnishes, dry colours, distempers, japans, lacquers and anti-corrosive oils, all being goods included in Class 1. The International Paint and Compositions, Ltd., 6, Broad Street Place, London, E.C.2, manufacturers and general merchants. March 19, 1924.

"DESEMINE."

446,618. For chemical substances prepared for use in medicine and pharmacy. William George Moore, 5, Hadlow Road, Sidcup, Kent, scientific research specialist. March 21, 1924.

B444,656. For acetates, carbonates, ethers, phosphates, sulphonic derivatives, chlorinated derivatives, chlor-nitro derivatives, amido derivatives, nitro sulphonic derivatives, amido sulphonic derivatives of phenols, cresols, benzene and toluene and salts thereof, nitro derivatives of phenols and cresols, aurine, acetanilide, amido salicylic acid, carbolic acid, cresols, cresol mixtures (cresylic acid), cresotinic acid, glauber salt, guaiacol, para-sulphamidobenzoic acid, toluene sulphon amides, phthalic anhydride, pyridine, salicylic acid, and xzlenol and derivatives, all being chemical substances included in Class 1; and varnish and wood preservatives included in Class 1. The Graessermonsanto Chemical Works, Ltd., Chemical Works, Oil Works Road, Cefn, Ruabon, North Wales; and 39, Billiter Buildings, Billiter Street, London, E.C.3; chemical manufacturers. January 22, 1924. User claimed from December 13, 1920. The applicants agree that this Mark, when registered, and the Mark No. 421,434 shall be assigned or transmitted only as a whole and not separately.

"STABISMETOL."

446,769. For chemical substances prepared for use in medicine and pharmacy. Boot's Pure Drug Co., Ltd., 37, Station Street, Nottingham; merchants. March 25, 1924. (To be Associated. Sect. 24.)

"NEOMERPIN."

446,807. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Chemische Fabrik Pott and Co. (a limited liability company organised under the laws of Germany), Priessmitzstrasse 39, Dresden, N., Germany, manufacturers. March 25, 1924.

Tariff Changes

CANADA.—The Budget resolutions, introduced into the Canadian Parliament on April 10, contain the following alterations in the Customs Tariff, which came into operation on April 11, relating to machinery and apparatus for use exclusively in producing coke and gas and for the distillation or recovery of products from coal tar or gas which are now subject to a British Preferential Tariff of 10 per cent., an Intermediate Tariff of 15 per cent., and a General Tariff of 20 per cent.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

CLEMENT AND JOHNSON, LTD., London, W.C, chemists· (M., 17/5/24.) Registered May 2, £100 and £100 debentures· part of £60,000; general charge. *£57,100 1st debentures· January 31, 1924.

DIAMOND SODA CO., LTD., London, N.W. (M., 17/5/24.) Registered May 5, £100 2nd debentures, balance of £200 and bonus of 5 per cent.; general charge. *£400. February 16, 1924.

HAMIRA AND CO., LTD. (late ABDUL ISHMAL HAMIRA AND CO., LTD.), London, E., perfume manufacturers (M. 17/5/24.) Registered May 6, £1,000 debentures, part of £2,000; general charge. *£500. May 4, 1922.

KEY PRODUCTS, LTD., London, E.C., chemical manufacturers. (M., 17/5/24.) Registered May 1, £50, £50 and £50 debentures, part of £500; general charge.

Satisfaction

MARLEY HILL CHEMICAL CO., LTD. (M.S., 17/5/24.) Satisfaction registered May 5, £1,000, part of amount registered March 21, 1921.

Receivership

HAMIRA AND CO., LTD. (Formerly known as ABDUL ISHMAL HAMIRA AND CO., LTD.). (R., 17/5/24.) B. Nash of 145, Whitfield Street, W.1, was appointed Receiver on April 25, 1924, under powers contained in debentures dated January 25, 1923.

London Gazette

Companies Winding Up Voluntarily

HOUGH HOSEASON AND CO., LTD. (C.W.U.V., 17/5/24.) James Buck, of 30, Brown Street, Manchester, accountant, appointed liquidator and authorised to enter into an agreement with John Richardson, on behalf of a proposed new company of the same name.

LONDON CHEMICAL WORKS, LTD. (C., 17/5/24.) A. N. Stockdale, 138, Glenwood Avenue, Westcliff-on-Sea, appointed liquidator. Meeting of creditors at the Chartered Institute of Secretaries, 59A, London Wall, London, E.C.2, on Monday, May 26th, at 11 a.m.

Notice of Dividend

BROOKS, Tom Cheetham (trading as R. CHEETHAM AND COMPANY), 25 and 54, George Street, and 4, Chorlton Street, Manchester, chemist and analyst. First and final dividend, 2s. 5d. per £, payable May 14, Offices of Harry L. Price and Co., 15, Fountain Street, Manchester.

New Companies Registered

ALAMBIC MANUFACTURING CO., LTD., Alambic Works, Works Road, Letchworth, Herts. Manufacturing chemists and druggists, etc. Nominal capital, £2,000 in £1 shares (1,000 7 per cent. preference).

G. ARNOLD AND CO., LTD., 82, Mark Lane, London, E.C. Chemists, druggists, drysalters, oil and colour men, etc. Nominal capital, £2,000 in £1 shares.

CROW MANUFACTURING CO., LTD., 133A, Charing Cross Road, London, W.C.2. Manufacturing chemists and manufacturers of and dealers in all kinds of metals, cement, lime, clay, etc. Nominal capital, £10,000 in £1 shares.

DRY ROT AND FIRE PREVENTION CO., LTD., 33, Furnival Street, Holborn, London. General and manufacturing chemists, metallurgical and analytical chemists, etc. Nominal capital, £100 in £1 shares.

LE PAGE'S GLUE CO., LTD., 4-10, Hatfield Street, Goswell Road, London, E.C. Manufacturers of and dealers in glues, adhesives, paste, inks, oils, varnishes, soaps, etc. Nominal capital, £2,000 in £1 shares.

PARKIN, NESS AND CO., manufacturers and retailers of chemicals, disinfectants, oils and lubricants, dyes. Nominal capital, £4,000 in £1 shares. Secretary: W. Raine, Roxby House, Darlington.

JOSEPH REED, LTD., 7, Turkey Lane, Harpurhey, Manchester. Manufacturing chemists. Nominal capital, £1,000 in £1 shares.

TECHINCAL OILS, LTD. Manufacturers and preparers for market of and dealers in oils, shale, minerals, wax, paints, pigments, varnishes, chemical, industrial and other preparations. Nominal capital, £7,500 in 5,000 preference shares of £1 and 50,000 ordinary shares of 1s. Solicitors: Francis and Johnson, 62, London Wall, E.C.

UPPER CYLINDER OILS, LTD., 27, New Street, Worcester. Manufacturers, refiners of and dealers in lubricating oils, greases, graphite, and oils and lubricants of all kind, etc. Nominal capital, £6,300 in 2,800 "A" preference and 2,500 "B" preference shares of £1 and 20,000 ordinary shares of 1s.

LESLIE WEST, LTD., 41, Trinity Square, London, E.C.3. Manufacturers of and dealers in artificial manures, fertilisers, insecticides, etc. Nominal capital, £5,000 in £1 shares.

Methyl Chloride as a Refrigerant

A REPORT on the thermal properties of methyl chloride has just been issued by the Food Investigation Board in connection with the Department of Scientific and Industrial Research, and published by the Stationery Office (pp. 16, price 1s.). The report has been drawn up by Mr. D. N. Shorthouse, M.A., who carried out the investigation under the direction of Professor C. F. Jenkin at the Engineering Laboratory, Oxford. The work arose out of that previously carried out on ethyl chloride in a similar manner, and published by the Stationery Office in Special Report No. 14 of the Food Investigation Board.

Methyl chloride was investigated with the object of obtaining the necessary data for the construction of charts for the use of refrigerating engineers. Some samples of the material used when received were contaminated with oil, but all measurements were made on redistilled material with boiling points from —23·7° C. to —24° C. Impurities can only have been slight and should not impair the usefulness of the results for engineering purposes. The methods adopted have been such as require no costly apparatus and only small amounts of the substance investigated.

Measurements of the following properties have been made :—

(1) Specific heat of the liquid and hence the total heat of the liquid.
(2) Saturation specific volumes of the liquid.
(3) Latent heat at —23·8° C.
(4) Density of the vapour at atmospheric temperature and pressure.
(5) Specific heat of the vapour at one atmosphere pressure.
(6) Vapour pressure curve.

The result of these determinations and the methods used are given in the report, which forms a valuable addition to the knowledge of refrigerants.

The Institute's New Register

A NEW register of fellows, associates, and students of the Institute of Chemistry has just been issued, corrected down to March, 1924. The whole arrangement is new, and has necessitated a considerable amount of work, but it should prove extremely convenient, as the names are arranged under geographical headings, with address, dates of association or fellowship, and in many cases the post held conveniently grouped. To facilitate reference there is an index at the end enabling any name to be found at once. The actual register has been corrected up to November, 1923, and the later corrections are embodied in a supplementary section. A few pages at the beginning of the book, which is strongly bound in paper and contains 322 pages, are devoted to a summary of the objects and aims of the Institute, lists of examiners, and other useful particulars.